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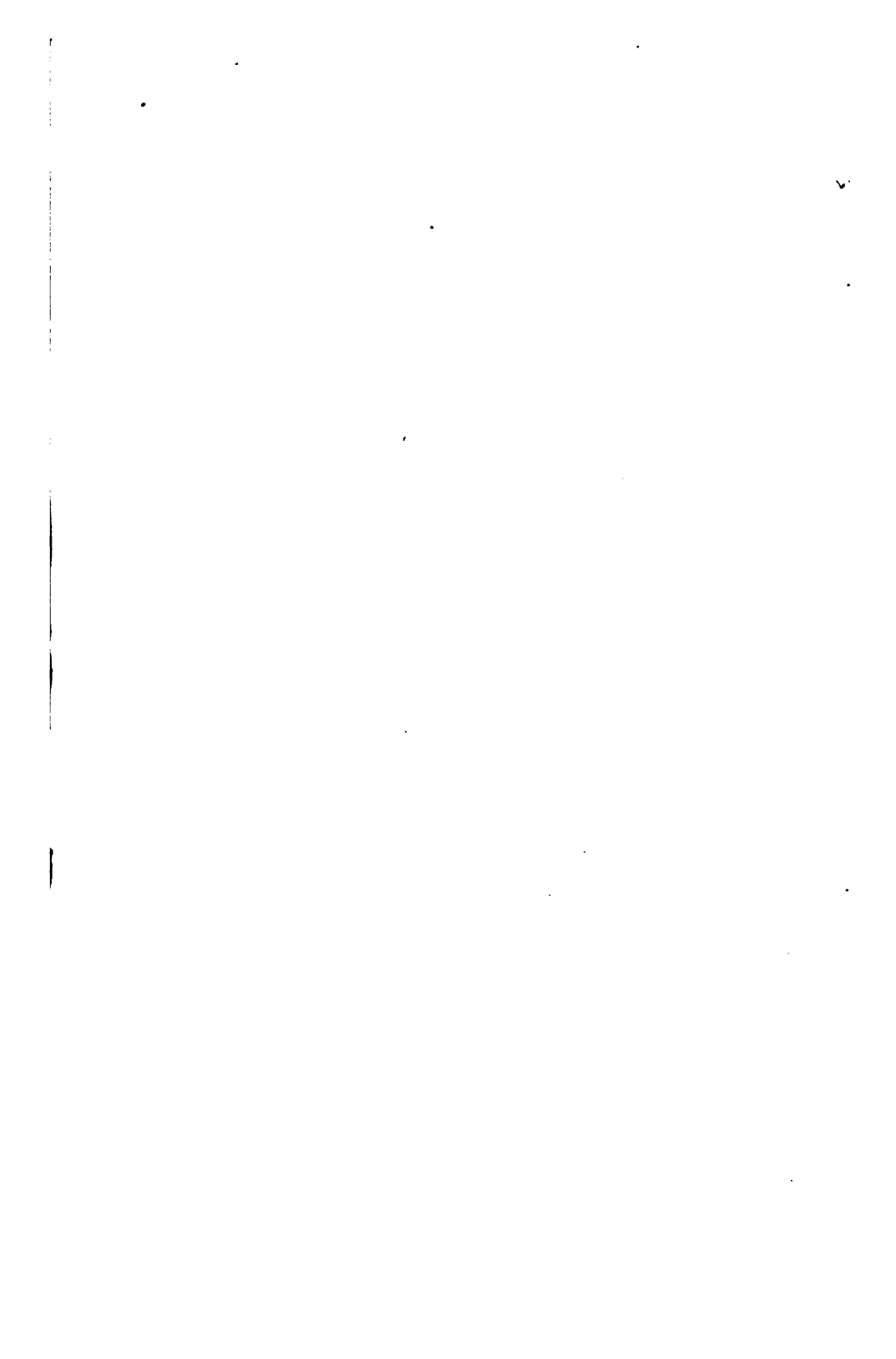
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Per. G. A. Wilts 8° 62







REPORT

OF THE

MARLBOROUGH COLLEGE

Natural History Society,

(FOUNDED APRIL 9th, 1864),

FOR THE

YEAR ENDING CHRISTMAS, 1880.

No. 29.

"TUM MIHI NATURE LIBEAT PERDISCERE MORES:
QUIS DEUS HANC MUNDI TEMPERET ARTE DOMUM."

MARLBOROUGH:

PRINTED BY C. PERKINS AND SON.
1881.

Per Gough ad. 1881
86/52

25/2.88

100
100

Green
The College,
Marlborough.

Apr 30/81.

My dear Madam

I am very glad you
liked the set of Reports: such as
it was. and you let me know
the pos. of the part w. was in
such an entirely safe, as I
will replace it, if opportunity
occurs.

I omitted to mention a correction
are sending off - in the part

for Xmas 1868 page 25, at the end
of the 3rd paragraph, please put
for "water" the word "naphtha", con-
taining no oxygen. The error is a
very serious one, & ought not to be
sent out to the world.

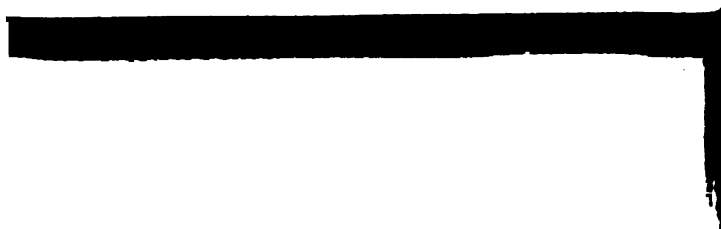
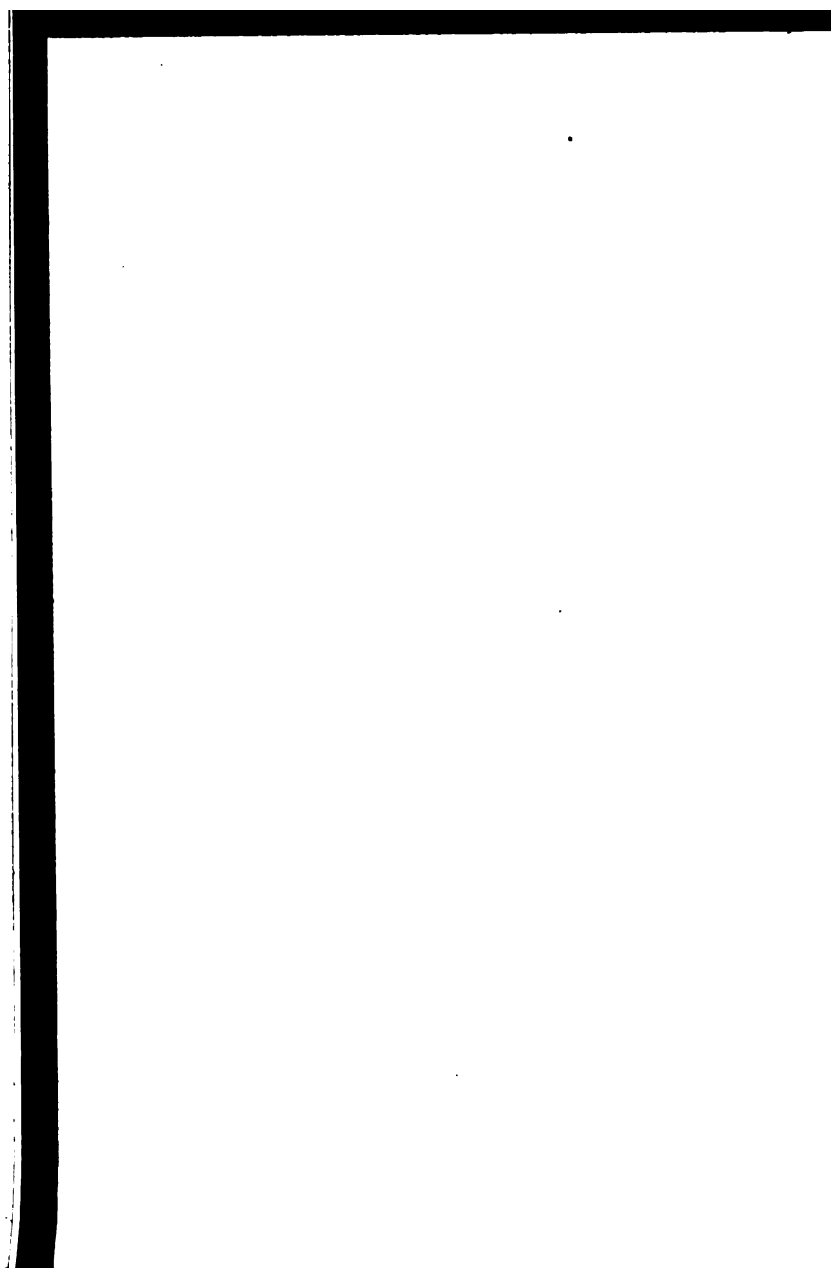
The friends of the Society are with
you, and of course if you wish
they anything for the Society, I have
no doubt Mr. Richardson may be
very glad to accept something.

at the same time, we are always
glad to help completely able as
far as we can. Perhaps the
whole thing may be cleared
up by our becoming an Hon. Mem.
in the case Mr. Richardson is the
person known to apply to.

Yours very sincerely

J. A. P. ^{Jun}

J. A. P. ^{Jun}



Recd
The College,
Marlborough.
Oct 11/71.

My dear Madam

I shall send off very shortly
a set of W.B.T. Reports which will
enable you to complete - I
consider it a very valuable
contribution for the next night
to the Bury Festival.

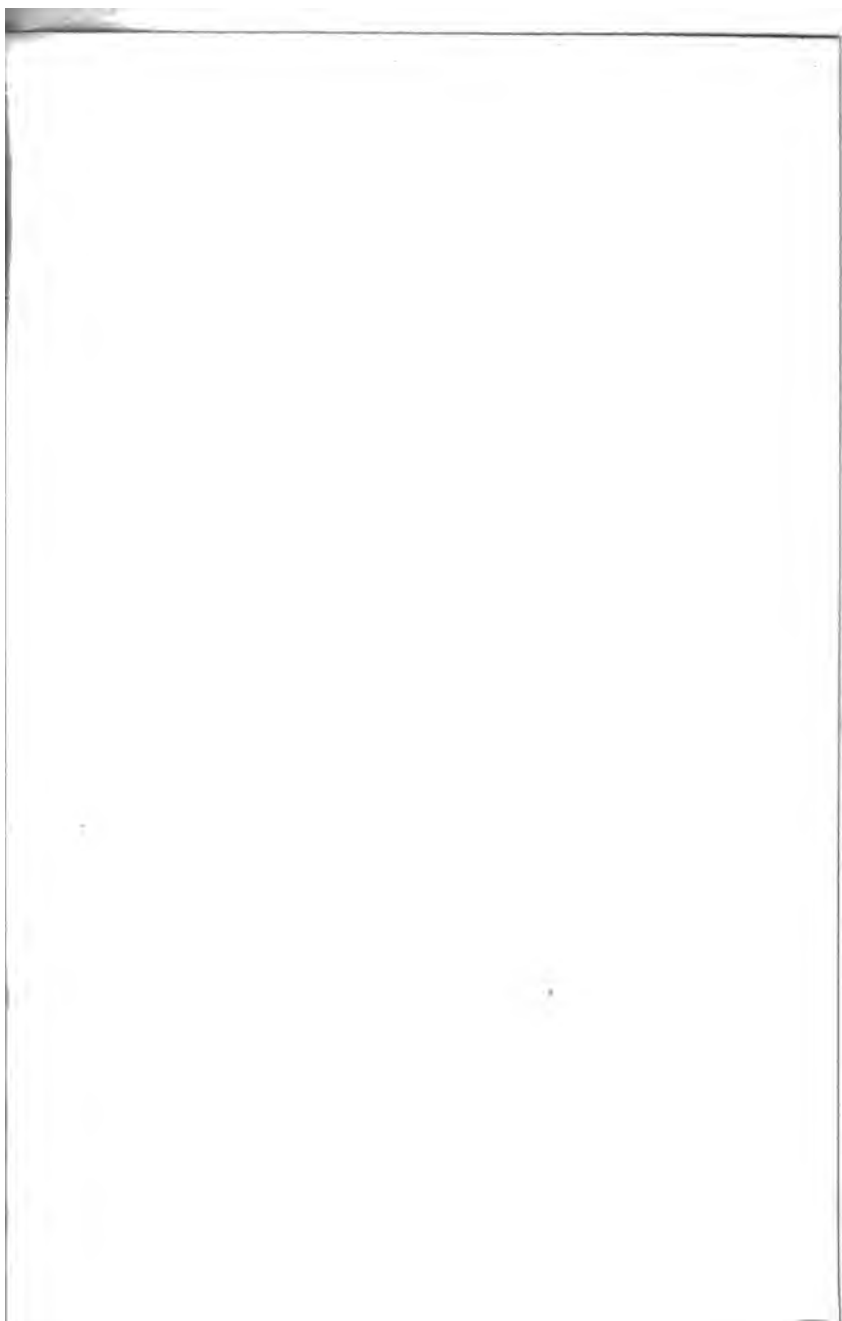
Yours truly is my Mother, but
it is the only one I can get now. I
picked up a little school room

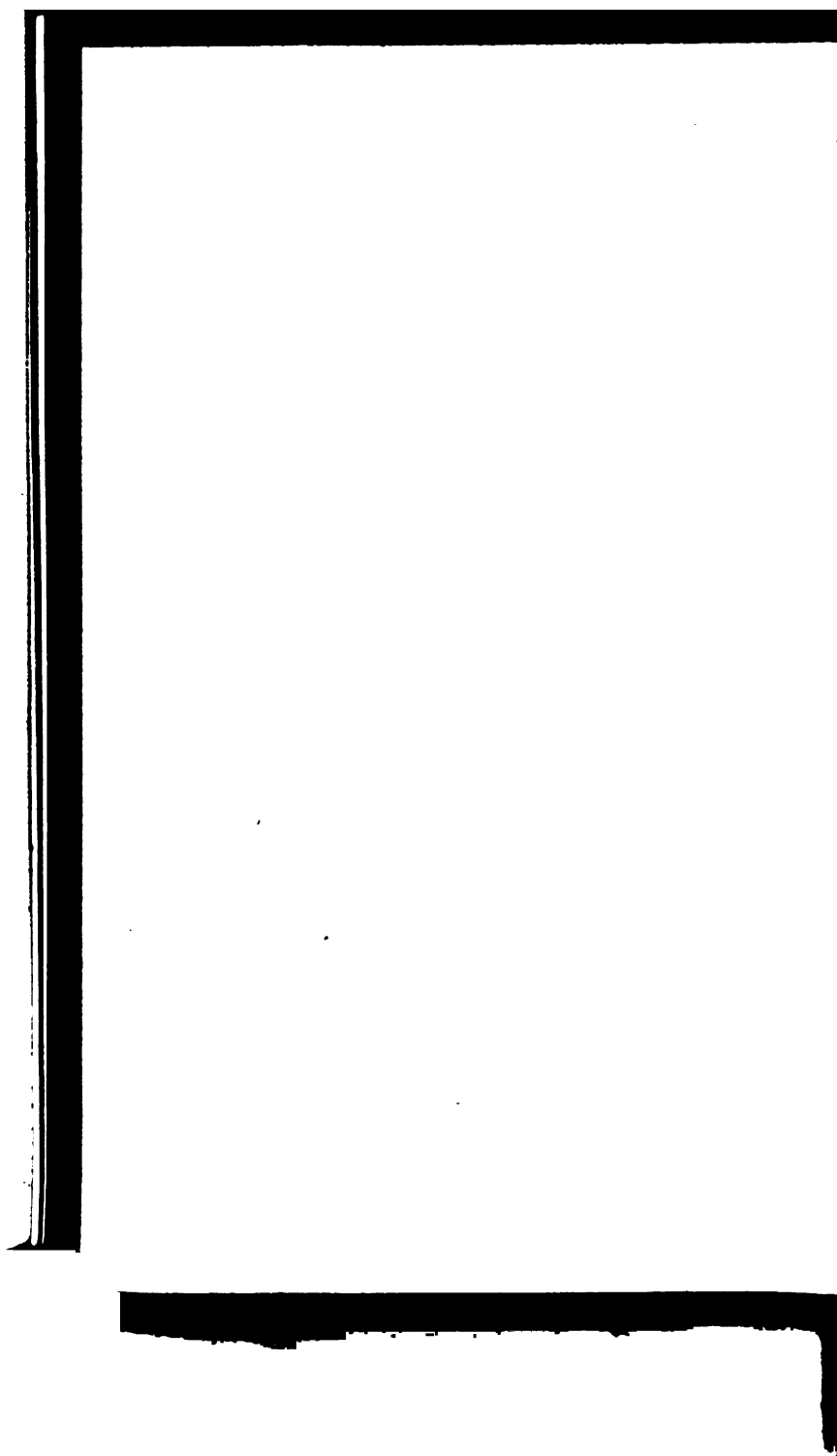
ays, but its price perfect,
so you must be
content with it.

Yours & wife

J. P. W.

Thurs 5





REPORT

OF THE

MARLBOROUGH COLLEGE

Natural History Society,

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MARLBOROUGH:

PRINTED BY C. PERKINS AND SON.
1881.

PREFACE.

IN issuing the 29th Report of the Marlborough College Natural History Society the Committee take the opportunity of expressing to the Master, the School, the Common Room, and other friends, their sense of the many proofs they have received of their sympathy and active support, which have gone far to render the past year so satisfactory and encouraging. And such support and encouragement were all the more needed because the Society has this year passed through a crisis. Its Founder retired twelve-months ago, after 16 years' devoted service, from the direct management of its affairs, but happily for us we are still able to offer our grateful acknowledgement of his invaluable help and hearty co-operation.

Our numbers, which now reach a total of 84 School members, have steadily increased, and the attendance at the fortnightly lectures has been so great, averaging little short of 100, that we have had to make special regulations to meet the case. Such large audiences have been to a great extent due to the variety of the subjects treated of, and the excellence of the lectures themselves. Masters, present members of the School, and Old Marlburians from the most distant quarters of the globe, have afforded the Society and its friends many an instructive and entertaining hour, as the Reports of our Meetings will show, and if the list of printed lectures seems somewhat meagre in comparison with previous years, it must be remembered that in an unusual number of cases the lecturer chose to speak from memory rather than to read a paper.

But successful as, thanks to our many good friends, our year's lectures have been, it is felt that there is still a want which it is the duty of the Society to supply. By these lectures difficulties have been cleared away, an interest has been excited that has led to further private reading, and much good has been done: but there has been no attempt at anything like systematic teaching. To remedy this defect it has been arranged to revive this term in a modified form the old system of sections which fell into disuse a few years ago. The REV. T. A. PRESTON and E. N. GARDINER will undertake a botanical section, and MR. HART-SMITH and P. H. MADDOCK an entomological one. The readiness with which the idea was taken up gives us good hope of seeing it succeed, and if such should be the case the system may be still further extended. The Committee will do all they can, but success or failure must ultimately depend on the amount of earnestness which private members possess.

Of the character of the work done in the competition for the Stanton Prizes it becomes us not to speak, as the Committee furnished the only three candidates and secured both the Prizes: but we do feel very strongly that the smallness of the competition renders abortive the Donor's object and is a discredit to the Society. It is now proposed to make the sectional work introductory to the Prize subjects for 1881, and with the valuable help thus afforded them we may well hope that the members of this generation will join in wiping away the reproach that at present attaches to us in this matter.

It was also felt that our practical work required more concentration, and in accordance with a suggestion made to the Committee, we have it in hand to map out the neighbourhood into different well defined districts, and to work one of such districts each year in rotation, regarding it from six points of view, namely, botanical, entomological, archæological, geological, ornithological, and conchological. By this method the knowledge obtained of the country round us will be more minute than before, and therefore proportionately more valuable.

For the actual work done during the last year we refer our readers to the special Reports, from which they can judge for themselves how far it is

satisfactory, and in what there is room for improvement. There are, however, two points in these Reports to which we would call attention. In the first place we would ask our ornithological members to lay to heart the advice given them, and to bear in mind that the English of Ornithology is not birds'-nesting. Many of the most fascinating pages in "The Life of a Scotch Naturalist" deal with Edwardes' acute observation of birds, but the word "egg" occurs but rarely.

In the second place we would put in a plea for the much-neglected beetle. It is true that he is at first sight less attractive than his more gaudy rival the butterfly, and that there are greater difficulties at first in his discovery and capture. But on the other hand, this unattractiveness is to a considerable degree superficial, and the difficulties that present themselves to a collector are mainly due to inexperience. Moreover the field is to all intents and purposes for us an entirely new one: and the success which has attended the very small efforts which have hitherto been made confirms the opinion of an experienced judge that our locality is one of the best in England from a collector's point of view. The two things needed were some one to direct the work, and some means of identification. MR. HART-SMITH has undertaken to supply the former want, and the latter difficulty has been removed by the kindness of E. MEYRICK, Esq., O.M., who has most generously made the Society a present of his entire collection made here some years ago, and consisting of over 500 specimens.

There is one branch of our work of which no Report will be found, for the sufficient reason that no work worth speaking of has been done. Geology is not in favour just now. The study is not less interesting than others that are keenly pursued, and if our neighbourhood is not the best in England, it presents much that will repay investigation, independently of the fossils which it contains. The making of the new railway has afforded good opportunities for anyone this way inclined, and amongst other things some unusually large ammonites have come to light again, notably the gigantic one added to our collection by the Master, which arrived just in time to illustrate a lecture on them by Mr. MACDONALD, which no one who heard it is likely to forget. It is needless to say that our county is painfully rich in

flints, which have never yet received from us the attention which they deserve. A most valuable, indeed we believe unique, collection presented to us some years ago by the Rev. J. F. BRIGHT, has been arranged and will be accessible to members this term. The same course has been adopted with regard to another most useful series of fossils, which will be viewed with the greater interest, in that it was given to us in our infancy as a proof of sympathy by the late PROFESSOR SEDGWICK. And yet another complete collection from the Paris basin, the gift of the Rev. C. A. ELTON, has also been set out for the first time. All this has been a heavy drain upon our funds, and we have besides at some cost secured the valuable services of an able geologist from London in weeding and arranging our already large collection. With these facilities, which could hardly be greater, at hand, it is a matter for regret that more has not been done of late. We cannot but think that there are many of our members who would be glad to take advantage of any proposal that would assist them, and hope that in our next Report we may be able to state that something has been done. Much will depend upon the success attending the sectional work of this term.

From what we have said our readers will see that important additions have been made to our museum : but these are by no means the only ones. For years past by the kindness of many friends from every quarter we have been gradually accumulating a vast and miscellaneous stock sufficient to satisfy the most varied tastes. It was felt that the time had come when some attempt at arrangement and classification could be made ; and the result has been a marked growth in the contents of the Museum, and the readjustment of several existing collections. We are greatly indebted, and herewith tender our hearty thanks, to the Misses Ormerod for the pains and skill with which they assorted and named our large but confused mass of shells, adding a very choice collection of their own from Madeira : so that our shell cabinet is now one of the most useful, and certainly the most beautiful of our possessions, and deserves to be better known than it is. Several boxes of foreign and well preserved shells, the gift of G. R. ASKWITH, O.M., whose printed lecture we would commend to the notice of all lovers of coins, came too late unfortunately to be incorporated, but room is left for them and they will be

transferred before long. Our coins have considerably out-grown their cabinet, which it has been decided to use only for Roman ones. The others, of which we now possess a very large number, have been provided with a fresh cabinet and are in course of arrangement ; a third cabinet contains a large collection of English coins, which have been already arranged. We would gladly make them more accessible than they are, but the certainty of their shifting their places in spite of the best intentions does not justify us in throwing the collection open : but by special arrangements they can be seen by anyone who is really interested in the study of them, and they as well as our historical medals are very much at the service of any member of the Common Room, who wishes to use them for purposes of illustration.

It was found sometime back that owing to the insecurity of the moth cabinet the specimens contained in it were being rapidly destroyed : and the Council of the College made a most handsome reply to our application for assistance by granting us the sum of thirty guineas, by means of which we have purchased an admirable cabinet with 30 drawers, into which the few undamaged specimens are being transferred from the old one, which will now be used for the MEYRICK collection of beetles. To replace some of the injured butterflies and moths two collections made for the Stanton Prize have been placed at our disposal : and we confidently appeal to the society for still further help.

Donations throughout the year have been many and various. Besides those to which we have already had occasion to allude we have received a very valuable case of sponges and shells from LIEUT. CARPENTER, O.M., from Barbadoes, which have been added to and set up to advantage under glass. We are glad to be able to acknowledge several photographs, chiefly in illustrations of geological formations, which will add much to the value of such specimens as those from the Giants' Causeway, when we have them framed and hanging beside them. That some idea may be formed of the rate at which our Museum increases we would point to the list of Donations published in the Report. While we gratefully welcome all such practical proof of sympathy we are confronted by two great difficulties,—want of funds and want of room to do them justice. We have given temporary relief to the

pressure by placing the large geological cases and other bulky matter in the adjoining Modern School class room, but the necessity of finding room for the new moth cabinet and the herbarium requires further changes. We will do what we can, encouraged by the certain hope that future generations will enjoy the benefit of wider space.

It is needless to say that in order to make these many additions and improvements we have incurred great expense. Our expenditure has been large it is true but we trust that the advantages secured to the Society and to the School will be considered adequate. We believe that a necessary work has been carried out: but the doing of it has nearly exhausted our resources. Our income owing partly to causes which are not likely to recur has been much above the average; but the same may be said of our expenditure, and we trust that with great economy we may be able to maintain our collections in a state of efficiency and from time to time make the additions which the kindness of friends may place at our disposal.

The contents of the Museum are now really considerable, and we venture to say not half so well known as they deserve to be. Had we more space and more money much that is now half hidden would be more conspicuously and therefore more advantageously exhibited: but as it is, we have done our best to make known and therefore to utilize our possessions by publishing a second edition of the catalogue, which we heartily commend to others besides our actual members, in the belief that they will find in it much that they would care to see, and which we shall always feel pleasure in showing them.

Permission to sit in the Museum has been granted to an unusually large number of members, and we are glad to admit that the privilege has not been abused as far as we can judge, and that due care has been taken. At the same time we could wish that more real work in connection with the objects of the society had been done there, and we expect that with the institution of the sections such will be the case this term.

Much the same may be said of the Field Days last summer. They were pleasant and not unproductive of good in more ways than one, but the majority of those who took part in them appeared to regard them rather as pleasure excursions than as opportunities for doing real business. With the

great increase in the number of competitors for the Stanton Prizes which we confidently expect to see, we have no doubt that a change for the better will be visible here also. Even to those few who have worked the country well the finding of two new plants by A. E. ALDWORTH, and the capture of a "Camberwell beauty" by Mr. COLEMAN may hold out hopes of some further discoveries yet.

Such is a rough sketch of our position, and of the work we have been doing. Along with other School institutions we have enjoyed a new access of life and vigour, and the experiences of the past year shows that one interest need not clash with another, but that there is room for us all. In conclusion we would most earnestly urge Members not to withdraw from the Society even though they find their time more fully occupied than it once was. And we make this appeal more for their own sakes, than for ours. In the Summer term especially it is of course difficult, and indeed undesirable for a promising cricketer to give up an afternoon, but there are other spare moments which he might employ in a way that he will not regret in after life wherever his lot may be cast. Those who remain with us we would ask to support every School and House Institution in a liberal spirit and with such vigour that not one of them may suffer loss by our existence: those who leave us we would ask to give our fellow institutions that support which they have withdrawn from us, so that the School itself will not be a loser.

Signed on behalf of the Committee :

H. RICHARDSON,

President.

Dec. 22nd, 1880.

MEMBERS.

LENT TERM, 1880.

President :

H. Richardson, Esq.

Secretary :

O. Elton.

Treasurer :

Rev. J. P. Way.

Committee :

G. F. Rodwell, Esq.

F. S. Alston

H. M. Elder

T. N. Hart-Smith, Esq.

E. G. Waddilove	W. F. Blandford	O. F. Waterfield
A. E. Aldworth	F. S. Robinson	S. G. Williams
S. B. Baker	E. K. Chambers	J. Z. M. Hamilton
A. Meyrick-Jones	E. N. Gardiner	E. M. Paul
H. P. Highton	H. G. Goodacre	F. J. Mead
C. H. Hooper	H. I. Nott	W. T. Grenfell
C. E. Cooper	L. Dennis	B. G. Usher
C. Hartley	E. Pedder	H. Woolner
J. W. Adamson	G. H. Browne	P. Horton-Smith
S. Grant-Dalton	J. Footman	H. C. B. Foyster
P. H. Maddock	V. E. Barrow	R. E. Few
G. G. L. Hadow	J. S. Wilson	C. H. Bucknall
G. F. Jessett	G. A. H. O. Berkeley	B. L. Bucknall
H. G. L. Pryce	H. B. Bird	
M. B. Lloyd	G. N. L. Molesworth	

46 School Members,

SUMMER TERM, 1880.

President.

H. Richardson, Esq.

Secretary.

O. Elton.

Treasurer.

Rev. J. P. Way.

Committee.

G. F. Rodwell, Esq.

T. N. Hart-Smith, Esq.

F. S. Alston

P. H. Maddock

Librarian.

A. E. Aldworth.

Members.

S. R. Baker
A. Meyrick-Jones
C. H. Hooper
C. E. Cooper
C. Hartley
S. Grant-Dalton
G. G. L. Hadow
G. F. Jessett
H. G. Pyrc
M. B. Lloyd
W. F. Blandford
F. S. Robinson
E. K. Chambers
E. N. Gardiner
H. G. Goodacre
H. I. Nott
L. Dennis
E. Pedder
G. H. Browne
J. Footman
V. E. Barrow
J. S. Wilson
G. A. H. C. Berkeley
H. B. Bird
G. N. L. Molesworth

O. F. Waterfield
S. G. Williams
J. Z. M. Hamilton
E. M. Paul
F. J. Mead
W. T. Grenfell
B. G. Ussher
H. Woolner
P. Horton Smith
H. C. B. Foyster
B. E. Few
C. H. Bucknall
B. L. Bucknall
J. F. L. Hardy
R. K. Cardew
F. B. C. De Chair
B. H. R. Daltry
A. J. Shears
C. E. Laidlay
F. W. Yeates
A. S. Grove
R. P. Hart Dyke
G. H. Grace
H. F. Nicholson
E. E. Adams

B. L. Reynolds
D. Bowly
G. T. K. Maurice
E. H. Mocatta
A. H. Bryans
E. J. Teesdale
B. T. N. Berkeley
P. H. Cannon
J. W. Allen
A. G. D. V. Chichester
J. J. V. Baker
C. H. Lance
R. W. Rickards
H. P. Mullens
G. Woolner
J. Acton
G. B. Rountledge
T. L. Trethewy
H. West
C. F. Stileman
E. B. Dawson
J. P. Perceval
W. H. Rotheram
C. L. Nicholson
H. G. Palgrave

78 School Members.

WINTER TERM, 1880.

President :

H. Richardson, Esq.

Secretary :

P. H. Maddock.

Treasurer ;

Rev. J. P. Way.

Committee.

G. F. Rodwell, Esq.

T. N. Hart-Smith, Esq.

F. S. Alston.

E. N. Gardiner.

Librarian.

A. E. Aldworth.

Members.

S. R. Baker	J. F. L. Hardy	G. Woolner
A. Meyrick-Jones	R. K. Cardew	J. Acton
C. H. Hooper	F. B. C. De Chair	G. B. Rontledge
C. E. Cooper	B. H. R. Daltry	T. L. Trethewy
C. Hartley	A. J. Shears	H. West
S. Grant-Dolton	C. E. Laidlay	C. F. Stileman
G. G. L. Hadow	F. W. Yeates	E. B. Dawson
G. F. Jessett	A. S. Grove	J. P. Perceval
H. G. Pryce	R. P. Hart Dyke	W. H. Rotherham
M. B. Lloyd	G. H. Grace	C. L. Nicholson
W. F. Blandford	H. F. Nicholson	A. G. Palgrave
F. S. Robinson	E. E. Adams	H. V. Thomson
E. K. Chambers	H. C. Bucknall	J. C. Tucker
H. G. Goodacre	B. L. Bucknall	T. H. A. Valintine
L. Dennis	B. L. Reynolds	F. Meyrick-Jones
E. Pedder	D. Bowly	E. C. Herbert
V. E. Barrow	G. T. K. Maurice	L. E. P. B. Falkiner
J. S. Wilson	A. H. Bryans	W. K. Weston
G. A. H. C. Berkeley	E. H. Mocatta	A. M. Fairbairn
H. B. Bird	E. J. Teesdale	T. Zachary
G. N. L. Molesworth	R. T. N. Berkeley	A. A. Capell
O. F. Waterfield	P. H. Cannon	H. W. Cholmeley
S. G. Williams	J. W. Allen	E. A. Molony
W. T. Grenfell	A. G. D. V. Chichester	N. S. De Jersey
B. G. Ussher	J. J. V. Baker	F. E. Drummond Hay
H. Woolner	C. H. Lance	A. L. Jackson
P. Horton Smith	R. W. Rickards	E. P. Adams
H. C. B. Foyster	H. P. Mullens	S. J. Mavrogordate.
R. E. Few		E. B. Badcock

84 School Members.

HONORARY MEMBERS.

Rev. T. A. Preston	R. E. Price, Esq.
F. E. Thompson, Esq.	Capt. R. B. Reed
W. E. Mullins, Esq.	H. J. Verrall, Esq.
Rev. J. Sowerby	O. W. Bourne, Esq.
Rev. G. G. Bradley, D.D.	H. D. Drury, Esq.
O. M. Bull, Esq.	Rev. O. Soames
W. Fergus, Esq., M.D.	H. P. Dixon, Esq.
S. B. Dixon, Esq., F.G.S.	W. A. Clarke, Esq.
W. H. Macdonald, Esq.	Rev. W. M. Furneaux
W. Mansell, Esq.	Rev. A. C. Smith
J. F. Duthie, Esq.	J. B. Fuller, Esq.
G. H. Dawson, Esq.	H. E. Garrod, Esq.
Rev. A. C. Almack	T. O. Harding, Esq.
E. F. im Thurn, Esq.	Rev. The Master
Rev. G. W. De Lisle	W. W. Goodchild, Esq.
H. A. Evans, Esq.	L. E. Upcott, Esq.
Rev. J. W. Mills	W. M. H. Milner, Esq.
W. W. Fowler, Esq.	T. N. Hart-Smith, Esq.
C. Sankey, Esq.	Rev. J. P. Way
A. H. Beesly, Esq.	H. Richardson, Esq.
F. E. Hulme, Esq.	F. S. Hewson, Esq.
Rev. C. E. Thorpe	Rev. C. W. Tayler
Rev. J. S. Thomas	Rev. J. Papillon
Canon Farrar, D.D., F.R.S.	H. B. Horner, Esq.
W. P. Sellick, Esq.	G. Sharp, Esq.
F. G. Rodwell, Esq.	G. W. Rundall, Esq.
W. D. Fenning, Esq.	R. Alford, Esq.

EXTRACTS FROM THE RULES.

That this Society be called the Marlborough College Natural History Society.

CONSTITUTION.

That the Society consist of Members and Honorary Members.

OFFICERS.

That the Officers of the Society consist of a President, Secretary, Treasurer, Librarian, and Curator.

ELECTION OF OFFICERS.

That the President have the absolute power of nominating the Secretary.

That those Members of the Committee, who are not ex-officio Members, be elected terminally, and that the retiring Members be eligible for re-election.

That the same rule apply to the Treasurer, Librarian, and Curator.

MANAGEMENT.

That the affairs of the Society be conducted by a Committee, consisting of the President, Secretary, Treasurer, and four other Members of the Society, two of whom, at least, shall be members of the School, to be elected from and by Members of the Society; three of whom shall form a quorum.

PRESIDENT.

That in case of an equality of votes, the President shall have a double or casting vote.

SECRETARY.

That the duty of the Secretary be to summon meetings (when necessary) of the Society; to keep a detailed report of the proceedings, as well as lists of Members and Visitors present at each meeting, and generally to act under the direction of the Committee in all matters connected with the welfare of the Society.

LIBRARIAN.

That the duties of the Librarian be to keep a Catalogue of the Library, with the names of the donors, and to see that the Library Regulations are carried into effect.

CURATOR.

That the Curator be responsible for the order of the Museum.

LIBRARY.

That any Member of the Society be at liberty to consult any of the books belonging to the Society, but that only certain volumes, to be decided on by the Committee, be allowed to be taken from the room.

MUSEUM.

That members have access to the Museum whenever a responsible Person is present, but that only certain members be allowed access at all times when the Room is not used for school purposes. Application for this privilege must be made to the President.

FIELD DAYS.

That the Field Days be confined *entirely* to Members of the Society, and that the President appoint a day on which names must be given in.

MEMBERS.

That the election of new Members rest entirely with the Committee.

That every Member pay a subscription of 2s. 6d. his first term, and 1s. every subsequent term.

That if a Member be elected after the commencement of the term, the amount of his subscription for that term shall be settled by the Committee.

That Members have the right to introduce two visitors at all general meetings of the Society.

That every Member must be present at two meetings, at least, every Term.

HONORARY MEMBERS.

That Honorary Members have all the privileges of Members except the power of introducing a Member of the School to the meetings of the Society.

That Honorary Members pay 5s. a half-year, for which they shall be entitled to a copy of the Report.

That Honorary Members may compound for all future subscriptions by the payment of a sum of two guineas.

SUSPENSION OF MEMBERS.

That any Member be liable to be excluded from the Society by the Committee, if in their opinion, he shall have failed to show sufficient energy in the working of the Society.

SECTIONS.

That the Society consist of sections to be formed for the more accurate study of the different branches of Natural History, and that every Member must belong to a Section.

That the question of the number of Sections be left open for settlement at the beginning of each term.

NEW RULES.

That any Member of the Society have power to propose any new rule or any alteration in an old one, provided the motion be seconded by another Member.

FIELD DAYS, 1880.

SATURDAY, MAY 15TH.

This was a most satisfactory and enjoyable day. About 40 started at 1.15, and on reaching Ramsbury Chace, did justice to Mr. Duck's excellent fare, and dispersed in various directions. Parties visited Ramsbury and Littlecote Manors, and others worked hard at their birds, flowers, and insects. The weather was splendid, though there was a high wind, and this visit to the most beautiful scenery in the neighbourhood was a great success.

SATURDAY, JUNE 12TH.

About 40 members of the Society, including several of the Common Room, took part in a Field Day, which though very pleasant, thanks to the weather, the scenery, and Mr. Duck, was somewhat barren in results. After dining in Chisbury Camp, the company broke up and reassembled for tea at Leigh Hill, arriving in scattered detachments, which had come some by way of Bedwyn Common, and others by Bedwyn Church, and Wolfhall.

SATURDAY, JULY 10TH.

A party of 80 drove down to Binck-knoll (vulgarly Bynoll) on the edge of the table land at the base of the Hackpen ridge, and overlooking the Swindon valley, returning by way of Avebury. It was a glorious day, and the cliffs, meadows, woods, and grounds of Bassett Down were looking their loveliest. The chalk yielded some fairly good fossils, while the majority of visitors devoted themselves to botany, though their search, as has been the case in both the previous Field Days this term, was not crowned with too great success, 178 being the total of the observations made.

MEETINGS HELD DURING EASTER TERM, 1880.

THURSDAY, FEBRUARY 12TH.

The President in the Chair.

The new President, H. Richardson, Esq., moved the following resolution —“That this meeting desires to take advantage of the opportunity offered by the retirement of the Rev. T. A. Preston, from the position of President, a position, which he has held since the foundation of the Society, 16 years ago, to place on record its affectionate appreciation of his unceasing care, devoted zeal, and large munificence, which have rendered such inestimable services to the Marlborough College Natural History Society.”

The resolution was seconded by F. E. Thompson, Esq., and carried by acclamation.

The Rev. J. P. Way then moved “That the above resolution be engrossed on vellum and presented to Mr. Preston.”

This was seconded by O. Elton, and likewise carried by acclamation.

A lecture was given by THE PRESIDENT, on ELEPHANTS.

There were present 26 members, 50 school visitors, 13 members of Common Room, 10 visitors. Total, 99.

THURSDAY, FEBRUARY 26TH.

The President in the Chair.

The following donations were announced :—

Some coins from L. E. Upcott, Esq., E. N. Gardiner, and others.

Some flint implements from Martinsell.

A paper (see page 29) was read by F. E. THOMPSON, Esq., on THE GEOGRAPHICAL DISTRIBUTION OF PLANTS.

There were present 26 members, 25 school visitors, 7 members of Common Room, 8 visitors. Total, 66.

THURSDAY, MARCH 11TH.

The President in the Chair.

The following donations were announced :—

Some coins from Mrs. Cane, A. J. Badcock, E. Bent, and H. C. Rendle.

A jawbone from Martinsell.

An invitation to the last Quaker Meeting held in Marlborough in the year 1826, from Mr. Neate.

A paper was read by E. F. IM THURN, Esq., O.M., on THE REDSKINS IN BRITISH GUIANA.

There were present 34 members, 58 school visitors, 7 members of Common Room, 4 visitors. Total, 103.

THURSDAY, MARCH 25TH.

The President in the Chair.

A lecture was given by W. M. SWEET, Esq., O.M., on LIFE IN NEW ZEALAND.

There were present 27 members, 39 school visitors, 6 members of Common Room, 4 visitors. Total, 76.

MEETINGS HELD DURING SUMMER TERM, 1880.

MAY 6TH, (PRELIMINARY).

The President in the Chair.

P. H. Maddock was elected on to the Committee in the place of H. M. Elder, who had left.

The President, after exhibiting some coins and fossils presented to the Society, supported the Master's recent appeal not to encourage the wholesale destruction of eggs, and exhibited some Photographs of Bude, and its neighbourhood.

The Rev. T. A. Preston exhibited some stag's bones and vegetable ivory, and mentioned the great assistance which our system of weighing and measuring had been to the Anthropometrical Committee of the British Association, and the favourable opinion which the Committee had thereby formed of the physical development of Marlborough fellows.

THURSDAY, MAY 13TH.

The President in the Chair.

A paper (see page 20) was read by T. N. HART-SMITH, Esq., on *CELL LIFE*, liberally illustrated by diagrams.

There were present 48 members, 50 school visitors, 6 members of Common Room, 1 visitor. Total, 105.

THURSDAY, MAY 27TH.

The President in the Chair.

A paper (see page 9) was read by G. R. ASKWITH, on COINS.

The lecturer illustrated his paper by the exhibition of a large number of coins of all ages from his own and the Society's collections, the former boasting some very beautiful and perfect Greek specimens.

There was a large audience, but the record of the actual numbers has unfortunately been mislaid.

THURSDAY, JUNE 10TH.

The President in the Chair.

The following donations were announced :—

A very beautiful collection of Shells from Madeira, presented by the Misses Ormerod, old and true friends of the Society, who have also most generously undertaken the difficult and laborious task of arranging the present collection of shells.

A case of valuable sponges, corals, and shells, from the Bermudas, sent over by Lieut. F. Carpenter, O.M.

Some coins from J. Z. M. Hamilton.

Egg of Chinese Goose, and cast of head of Dodo, from H. G. Goodacre.

Large Ammonite, from new railway cutting, from the Master.

Pair of Indian fly fans, from G. G. L. Hadow.

A basket of fossils from the chalk, and a gigantic Ammonite, from Mr. Guppy.

A lecture profusely illustrated, was then given by W. H. MACDONALD, Esq., on *AMMONITES*, to a very full house.

THURSDAY, JUNE 24TH.

The President in the Chair.

A lecture was given by G. SHARP, Esq., on GLACIERS, which was illustrated by a large collection of photographs and pictures of Alpine scenery, kindly lent for the occasion. The room was again crowded.

THURSDAY, JULY 8TH.

The President in the Chair.

A case was exhibited, showing off to advantage the handsome present from Lieut. Carpenter, announced at the meeting of June 10th, tastefully arranged and added to by Miss Preston.

A lecture was then given by H. L. CALLENDAR, on METEORITES, which was supplemented by the Master and Mr. Preston.

Of the numbers of the meeting, which was a large one, the record has not been kept.

WINTER TERM, 1880.

THURSDAY, SEPTEMBER 23RD, PRELIMINARY MEETING.

The President in the Chair.

P. H. Maddock was appointed to the office of Secretary, vacant owing to O. Elton having left, and E. N. Gardiner was elected on to the Committee.

The following donations were announced :—

Skull and ribs of a Dugong, and an embryo skeleton of the same from Australia, T. E. Hammick, Esq., O.M.

Double crested Grebe (mounted) from Australia, O. F. Waterfield.

Cloth made from bark of mulberry tree, from Fiji, „

Purse and cap, from Himalayas, W. H. Rotheram.

Four tesserae, from Silchester, E. N. Gardiner.

The President also notified (i) the arrival of the new Moth Cabinet into which the still perfect specimens from the old one would be transferred.

(ii) That the shells arranged and named last term by Miss Ormerod, had been placed in their proper cabinet, where they form a very beautiful collection.

(iii) That two stands had been added to the Museum to contain the 17 new trays which had been filled with various donations made to the Society in past years, and now as far as possible classified.

There were 58 members present.

THURSDAY, SEPTEMBER 30TH.

The President in the Chair.

The following donation was announced :—

A very handsome and perfect specimen of the Camberwell beauty, caught by Mr. Coleman, in the holidays, on the hill side beyond the railway.

A paper was then read by N. MANDERS, Esq., O.M., on PHOTOPLASM, and after a vote of thanks had been proposed by Mr. Hart-Smith, some objects in illustration of what had been said were exhibited under the microscope.

There were present 48 members, 26 School visitors, 3 members of Common Room, 5 visitors. Total, 80.

THURSDAY, OCTOBER 14TH.

The President in the Chair.

The following donations were announced :—

A large and varied collection of shells, corals, &c., many being from the China Seas, G. R. Askwith, Esq., O.M.

A box of beetles, ditto.

The lecture was then given by the Rev. T. A. PRESTON, on THE POTATO, to illustrate the contents of one of the new trays, with practical experiments to show the amount and quality of the starch to be found in the potato.

The thanks of the meeting were offered to the lecturer by Mr. Thompson.

There were present 57 members, 35 school visitors, 2 members of Common Room, 1 visitor. Total, 95.

THURSDAY, OCTOBER 28TH.

The President in the Chair.

The following donations were announced :—

Collection of fossil teeth, H. L. Callendar.

A short-eared owl, shot on Ogbourne Downs, H. Leaf, Esq.

A merlin (female) mounted, from Dartmoor, G. H. Dawson, Esq., O.M.

The President, while congratulating the three candidates for the Stanton Prizes on the excellence of the work done by them, pointed out the very serious mistake, which other less advanced members of the Society were making in holding back from competition simply because the chances of success were against them.

Mr. Hart-Smith then appealed to the Society to render him more active assistance in forming a collection of Coleoptera, a branch of Entomology which has received less attention than it deserves, and for the study of which this neighbourhood is one of the best in England.

A paper (see page 54) was then read by the Rev. J. P. WAX, on DEEP SEA DREDGING.

The thanks of the meeting were expressed by G. H. Dawson, Esq., who then introduced his donation to the Society.

THURSDAY, NOVEMBER 11TH.

The President in the Chair.

The following donations were announced :—

Rossiter's hand book of Physics, and Mivart's lessons in elementary Anatomy, F. E. Hulme, Esq.

Photograph of Chedzoy Church, H. P. Mullens.

A paper (see page 42) was then read by E. MEYRICK, Esq., O.M., on A NATURALIST'S EXPERIENCES IN AUSTRALIA. On the subsidence of the applause which greeted the lecturer when he had finished, the Master proposed a vote of thanks, and photographs of the gum tree forests and some specimens of the more curious lepidoptera were passed round.

There was a very crowded meeting.

THURSDAY, NOVEMBER 25TH.

The President in the Chair.

The following donations were announced :—

Two Sous piece, French, 1792, J. Bell.

A collection of 500 beetles made at Marlborough, E. Meyrick, Esq., O.M.

A new moth cabinet with 80 drawers, The Council.

British mill stone (upper) of sarsen stone from Fyfield Downs, Mr. S. H. Neate.

The President was able to announce that the working members of the Society had so much increased during the year that it was proposed to form sections next term for the special study of Botany, under the direction of Mr. Preston and E. N. Gardiner, and of Entomology under the direction of Mr. Hart-Smith and P. H. Maddock.

A paper (see page 66) was then read by THE MASTER, on WIND AND WEATHER, admirably illustrated by barometers, charts, and other appliances, the latter being furnished by H. L. Callendar. A vote of thanks on behalf of the meeting, which included a strikingly large number of the Common Room, was moved by the Bursar.

There were present 50 members, 18 visitors from the school, 36 members of Common Room and friends. Total, 104.

COINS,
By G. R. ASKWITH.

READ AT A MEETING HELD ON MAY 27TH.

In speaking about Coins it is not my purpose to enter into elaborate description of the whole series of coins and exchange ever since the world began, for of course it would be utterly impossible to condense such a history into a few minutes talk, especially when I know little about minute and technical particulars; but my desire is to give a sketchy and cursory glance at both ancient and modern coins, assisted by specimens and illustrations. The subject is wide, and I am afraid beyond my powers, but I will do my best. And first, I must state that I am not going to speak of *medals*, such as those struck to commemorate accessions to the throne, or great victories, but about coins proper, which have been used as a circulating medium of exchange, and consist of some metal. For I have no intention of digressing into a long history of substitutes for coins, like strings of glass beads, pieces of white cloth, or square bits of salt, such as are still used in Ethiopia, cowries, shells, &c. True coins are each individually of a precise weight and value; they are generally stamped with some sign, and passed by counting or *ta'e*, and not by mere weight.

The reason for their origin is simple enough. They obviously were invented to form the easiest method of exchange. Men wanted some light exchangeable substance, and found all they needed in metal. It was hard, not too common, not hurt by being moved, and easily divided or reunited, so it was used for exchange, and to make exchange easier divided into fixed definite divisions, with a fixed value for each division, the idea of making them round probably coming from seals, for the earliest coins were only stamped upon one side, and were in fact, sealed metal, instead of sealed wax. It may be asked, why study coins? Of course one of the best answers might be, why not study them, or why study anything at all? But apart from this deep question which I will leave to your consideration, coins are worth studying for many reasons. They not only teach history, but make the learning of history pleasant, and throw much valuable light upon history. They bear record, and true record of early civilization and passed events. Sometimes they are the only record extant. From the third century before Christ to the twelfth century after, a complete history might be written of

a country in which we are somewhat interested at the present moment; Afghanistan and North west India, from coins and coins only, as there are no other monuments extant. Again, Gibbon says, that "were every other record destroyed, the travels of Hadrian might be traced by his coins alone." Now Hadrian spent all the time of his reign in moving about from place to place, and at every place he came to coins were struck in his honour. The position of the town Hadria, to take one instance, from which the Hadriatic sea took its name, was only found out by means of a coin. They are of the greatest possible use in studying Greek sculpture, particularly as they are original works of art, not copies like most of the existing sculptures. They form the best series for illustrating the various advances of sculpture. Busts have been recognised, likenesses made known, for there is a gallery of portraits all but complete from Alexander to Augustus, and dates fixed by coins. It is said that a complete history of ancient ship building might be written from them, and certainly they afford great insight into the mode in which the Greek ladies dressed their hair. In these coins of the island Lencas, the modern Sta. Maura, four most elegant methods appear. They have been the means of verifying eclipses and comets. Everything shows that it is very advantageous to study them, and when once a start has been made, you will find it a most interesting and fascinating pursuit, all the more so if you can form a collection of your own. Public collections are numerous. There are great ones at Vienna, at Gotha, at the British Museum; and there is the world famed one in the Louvre at Paris. There is also a collection at Berlin, famed for its massive gold pieces of the Roman Emperors, but Frederick the Great thought it a pity such valuable material should lie unused, so he melted most of them down, into ducats. These are the chief national collections, besides which there are numberless collections of individuals, and I hope that some of you will add to the number.

Beginning with the earliest kind of coins we find that they probably were not round, but made in the form of ring money, a custom first arising in the east, and then spreading westward, over Gaul and Britain. This ring money was used for ornament as well as for use, being in the shape of long wire twisted generally round the neck, made of flexible gold, and of definite weight. The gold was very pure and therefore very soft, so it may have been carried in this fashion to prevent loss from the pieces rubbing together, which they would have done if carried in a bag. Some of these rings or *torques*, as they are called, are as long as four feet. A large mass of them was found at St. Quentin in France, worth more than £1000 in pure gold, but this value proved their ruin, for they were soon melted down. From this ring money to round coinage was a long step. It is generally supposed that the Lydians first coined round money of gold, and this is very probable

considering their position. For though the Lydians themselves were not very great traders, on the one side lay Tyre, the great mart of that time, and on the other side Greece. They were not so much taken up with trade, as to have no time for new inventions. Their country was very rich in gold. Everyone has heard of the golden sands of the Pactolus. The Greeks had a great deal to do with them, and probably assisted them, whereas Tyre would never receive anything new from Greece, for the Phœnicians were wrapped up in their own pride and trade just like the Jews. Again, about the time that gold is said to have been coined, in 800 B.C., a new dynasty under Gyges, well known from the story of the ring he threw into the sea, came to the Lydian throne, and new dynasties often give fresh impulse to the life of a country; and further not very much later lived Croesus, whose wealth has become proverbial, perhaps from his having gold coinage. To sum up, it was the inventive mind of Greece working through Lydia, a land where gold was found in plenty, that produced the first gold coinage.

Now the earliest silver coins are said to have been made in the little island of Ægina, and this again, even though it be only a supposition, is extremely probable. Ægina may be a small and barren island, but the influence it has had on the world's history is large. Take the shores of the Mediterranean, and almost on every coast is found some place with which Ægina was closely connected—Cyrene in Africa, Gades in Spain, Massilia in Gaul, besides numberless other towns in Magna Græcia or Southern Italy, on the shores of the Euxine, and in Asia Minor. Even in later times, in the days of Pericles, in the days of the summit of Athenian power, its might was so great that it was called "the eyesore of the Piræus." Besides, the Æginetans had great facilities for coining silver, because they could obtain metal close by, from the great mines of Laurium. Vast numbers of their coins still remain, chiefly stamped only upon one side with a turtle or tortoise, while the other has the impress of the punch by which the metal was driven into the die. Here are two instances, the first with a punch mark deep, the smaller with a shallow mark. The old method of coining was always done by this *punching*. The punch had indentations, and was square, to prevent it slipping, and by it the metal was hammered into the die. In later times the punch was often ornamented with letters or figures. Such punched coins are called *incused*.

The Lydian gold coins were called staters, meaning a standard, and when copied by the Macedonians were called Philipps, from their king Philip, and when copied by the Persians, Darics, from their king Darius, just as in modern times we speak of Louis, and Napoleons. The Darics of Persia are extremely rare, partly because Alexander the Great melted them down to

recoin them in his own style. They passed into India and all over Asia. One of the governors of India with difficulty obtained some, and sent them home to the managers of the East India Company. They melted them down.

The Greeks soon improved on the rude Lydian coinage, and first substituted engraved dies for the rude punches. Their silver coins were named obols and drachmas. Obol comes from obelus, a spike, and drachma means a handful, and was equal to 6 obols, because the hand could just grasp 6 of the spikes, the earliest kind of counted money; and the names still remained when the spikes were superseded by positive coins. In fact the divisions of Athenian money are extremely easy to remember. First there was the talent, (about £243 15s. modern value). This contained 60 minæ (£4 1s. 3d.), and each mina contained 100 drachmæ (9½d.), each drachma 6 obols. The Athenians had silver coins from the size of 4 drachmæ down to a ¼ obol. Their copper coinage was introduced later than silver, about 400 B.C. Dionysius is said to have been called "the brazen orator" because he persuaded the Athenians to coin copper. The first coinage was called chalcos, two being equivalent to ¼ obol. Later the chalcos was further divided into lepta, 10 to 4 being equal to the chalcos, according to different writers. This coin with 2 owls is a dilepton, its value being thus shown.

I have here examples of a good many Greek silver and copper coins. These are entirely taken from a collection of my father's, made by him and a brother officer when stationed at Corfu, before that island ceased to be an English dependency, in their holiday travels through Albania, Montenegro, Southern Italy, and the Morea. The Roman coins mostly come from the collection in the Museum, the modern coins are my own.

The earliest symbols the Greeks employed were always of a sacred character, and always euphemistic. They may be divided into classes. (1). There are emblems referring to the foundation of the state or in some way connected with it, as the parsley leaf is found on the coins of Selinus, an emblem of the river on whose banks it grew. The phoca or seal is found on the coins of Phocis, because seals preceded the ships of the first emigrants. Leucas or Sta. Maura was colonized from Corinth; therefore on almost all Leucadian coins appears the Pegasus, the symbol of Corinth. In Aetolia took place the hunt of the Calydonian boar in which the nymph Atalanta took part; therefore on Aetolian coins Atalanta's head is struck, and on the other side the Calydonian boar. On one of these coins there is the jawbone of the boar, and the spear which killed the boar. (2). The second division consists of emblems referring to the protective gods of the state, or connected with legends of gods. On most of the coins of Athens appears an owl and a sprig of olive, the symbols of Pallas, whose head is generally on the other side. At Eretria, in Euboea, Io's burial place was shown. So on this coin

appears to as a cow scratching itself. On the other side is an octopus or cuttle fish. This coin is especially interesting to me, because on taking it once to the British Museum. £3 was offered for it, as they did not possess a coin of that size. On the coins of Sicyon appears a dove, because Aphrodite's worship was brought there from Cyprus; and often a Chimaera because Bellerophon was honoured here as much as at Corinth. Sicyon was famed for its patronage of the arts, and its coins are very beautiful. Heraclea Sintica was on the river Strymon in Macedonia. On some of its coins appear a swan and a lizard, emblems of that river. (3) The third division consists of the images of the gods themselves. On the coins of Ephesus there is an exact representation of the image of Diana of the Ephesians, and, as I said, Pallas generally appears on the coins of Athens. (4) The fourth division are personified portraits of sovereigns, but only when the sovereigns were considered deified. The innovation was as yet too great for kings to put their likenesses plainly on their coins. Alexander appears on the coins of Macedonia, as the young Hercules with the lion's skin round his head. Perhaps we may add another division of emblems referring to passing events or to qualities on which the city especially prided itself. For instance, on many of the coins of Macedonia there are chariots with victory crowning the charioteer, because Macedonia at one time especially prided itself on excelling at the Olympic games. Letters and inscriptions were gradually introduced, though some countries never assumed them. For instance, Boeotia was always content with its peculiar shaped shield, a symbol adopted by no other country. Monograms even appear on some coins.

The portraits of sovereigns, which is now the common device, first appeared about 350 B.C., in the reign of Philip II, Alexander the Great's father, but only in a deified form; Philip has a laurel wreath round his head and is represented as the youthful Hercules. In his reign the gold mines of Thessaly were discovered, and he issued so many gold "Philipps" that some even now are said occasionally to be found in circulation. Alexander the Great carried on his plan. His head appears upon coins under the guise of Hercules, with a lion's skin, adopted after his Indian victories, while the other side generally has Zeus Aetophoros, or the eagle bearing Zeus.

After Alexander's death when his kingdom was split into portions, Seleucus obtained Syria, and Ptolemy Egypt, and both, as well as their successors, continued the practice of putting their own portraits upon their coins. This coin is of the reign of Ptolemy, named Philadelphus or brother lover, because he put his two brothers to death. He was a great patron of the fine arts. In his reign the LXX was made. Enolid lived at his court, and he increased the library at Alexandria to 200,000 volumes. Perhaps one of the finest portraits of kings occurs on a coin of Mithradates vi, king of

Pontus. The legend is that the head was copied from a silver statue. It is supposed to have represented Mithradates driving in a chariot, as the hair seems blown back by the wind.

But it was not only in Greece proper that coins were brought to a high state of perfection, the islands of the Aegean have most beautiful coins, and about the 8th cent. B.C. the art was carried over into southern Italy or Magna Graecia, where it made such rapid strides that the mother country was outstripped. The most beautiful coins of the world indeed belong to Sicily and southern Italy. And this is all the more curious because Sicily was under the rule of despotic tyrants and was frequently overrun by the contending armies of the Carthaginians and Sicilian rulers, while southern Italy developed a beautiful coinage before the very rudest coins had even been thought of in the parts around Rome, showing how very scanty at that time were the means of communication by land for even short distances.

The great city of Sybaris, famed for its luxury, founded 721 B.C., and destroyed 510 B.C., had very remarkable coins. Instead of being thick like most coins of the period, they are thin and flat, with a fine device in a very sharp relief on the obverse, while on the reverse there is the same device hollow. Soon after it was destroyed it was founded again by the Athenians under the name of Thurium, and henceforward had the head of Pallas, the Athenian goddess, bound in laurel, as a token of gratitude, placed on its coins. Tarentum, which lasted longer than any city of Magna Graecia, partly owing to its magistracies and offices being open to both patricians and plebeians, and partly to its being on a tongue of land and therefore difficult of attack, had very fine coins, notwithstanding its being a colony of Sparta, which was always supposed to have held the fine arts in contempt. But after the Romans obtained possession of southern Italy, everything was levelled, and the fine arts nearly died out.

The finest coins of Sicily, especially of Syracuse, were produced about the time of Pericles, under the great tyrants, Dionysius I and II. One celebrated coin of the latter's reign has on one side the head of Proserpine, on the other a quadriga with Victory crowning the charioteer. Beneath ΑΘΛΑ or Prizes are represented. The head is said to be the most highly wrought head ever struck on a coin. The great enemy of the Sicilians, Carthage, is supposed to have obtained knowledge of coins through the Greeks, and all their coins are said to have been struck by Greek workmen in their Sicilian possessions. Most have the head of Ceres, and on the reverse the national emblem of the horse, taken because Dido is said to have found a horse's head when digging the foundations of her new city. Spain was colonized both by Carthage and Greece and may have drawn coins from either of these countries. The coins are very inferior. The lower classes

of the Spaniards now pass any little lump of copper as a coin, even buttons occasionally, and often coins, many hundreds of years old, are still found in currency.

But the Greek coinage as well as that of Carthage, of Spain, of Gaul, of almost every land was doomed to fall before the rising power of Rome. Rome introduced her copper, with Roman weights and Roman values in place of the silver and gold of other countries, and that with the most marvellous rapidity. Copper was abundant in Italy, and the first coinage of the Romans consisted of great square blocks of copper weighing 12 oz. apiece. One piece extant called a *quinounx* weighs nearly 5 lbs. Coin is hardly the proper term for these masses, as they are *cast*, not struck with the *cuneus* or wedge-like punch.

The Romans first struck *silver* about 270 B.C., at Rome, though they had used imported silver previously, and allowed subject nations to coin money of their own with the inscription 'Roma.' That with the galloping horse is supposed to have been struck in the Carthaginian portion of Sicily after its subjection by Marcellus. The head of Roma, or else Minerva, generally appeared on the silver coins, with a chariot or some other design on the reverse, till the time of Julius Caesar, who first had his head stamped by the authority of the senate. The chief silver type was the denarius, the memory of which still survives in our £ s. d. Some of the most curious coins of the Republic are *family* coins, struck by the great families. The *Torquati* represented the torque their ancestor had taken from the Gaul, placed round the head of Roma. The *Titurians* traced their descent from the Sabine *Tatius*, and on their coins *Tatius* and his men are shown crushing *Tarpeia* beneath their shields. But family and republican coins were soon alike merged in the *sestertian* coinage of the Emperors. Yet though they might coin gold and silver of their own free will, the national coinage was still *copper*, so on all copper coins of the first period is found the letters S.C., *Senatus Consulto*. But the Roman Emperors soon ceased to have any regard for the servile senate, and this last symbol of power was dropped except when Emperors desired to gain popularity by using it. The most slavish inscriptions were put upon coins. Herod the Great stamps his with the words 'Lover of Caesar.' The Emperor was called *pater patriae*, and *divus*. Augustus the first Emperor had to use considerable tact before he could get his head stamped to prevent offence among the people, but before he died all republican feeling vanished and coins were struck in honour of his Empress *Livia* with the title 'mother of the world.'—It is remarkable that on the coins of his successor *Tiberius*, the inscription is T.L. C. CAESAR, Caesar being in full, so that the word Caesar would be the most natural answer for the Jews to make when the question was asked 'Whose is this image and superscription?'

The mad Caligula was the first Emperor to drop the letters S.C., wherefore we find a decree of the senate after his death ordering all his money to be melted down and recoinied that 'the odious name of Caligula may be forgotten.'

The finest period of Roman coinage was in the time of the Emperor Nero. Instead of being a hideous monster, we see by coins that he was an extremely good looking man. In spite of the short reigns of his successors fine coins were struck, especially under the tyrant Domitian, but the types are so many and various that it is impossible to give account of them now. Trajan's Coins are extremely fine. The column of Trajan is so accurately represented on some of them that it is said that even if it was destroyed, it could be completely restored from the copy thus preserved. The Emperor Hadrian who succeeded spent his whole time in travelling, and struck multitudes of coins by which his journeys can be traced. We see by them that he was the first Roman Emperor to wear a beard. He was a great patron of the fine arts and his coins are very beautiful. With the Emperor Antoninus the art of coining began to decay, though his empress Faustina has some fine coins. He was fond of very big coins and medallions, but after him it rapidly sunk to the rudest possible types. Emperor after emperor received the purple in quick succession, yet they nearly all found time to have coins struck in their honour, and they are mostly interesting at this period from recording the reigns of various rulers, not from any beauty of their own.

The Great Emperor Constantine introduced a new style, the Byzantine, coined by Greek artists. It was of very low relief, with no force or energy, but great repose. Even this style became more and more debased. The Empire was torn to pieces by dissensions within and barbarians without, so that the rude coinage becomes at last almost unworthy of mention. In England for instance Roman coinage appears, after it had been the sole currency of the island for four, nearly five, centuries, to have died entirely out. The Saxon pennies or *skettas* which succeeded them, are not in the least like the coinage of Rome, so we must leave Rome, and pass to England, just noticing on the way the Jewish shekels, having on the one side Aaron's rod that budded, on the other a pot of manna. But first, one word of caution, 'Beware of forgeries.' These forgeries are the great difficulty in collecting Roman coins. Thousands on thousands of false coins have been struck. Some of the dodges are very clever. A man in Smyrna made a manufactory for coins and then buried them, to be dug up and sold before the eyes of delighted travellers who thought they had got the right thing. Another method is to saw two coins into two parts length-wise, and join the backs together so that the 'heads' of one Emperor, would be joined with the

'tails,' of another. A man at Lyons coined inventions of the Thirty tyrants with perfectly new types, names, and inscriptions, all invented by himself.

A series of silver pennies (with occasional halfpennies) formed the only money of this country from Egbert up to the reign of Edward III, from 800 to about 1350 A.D. The term Penny is said to be derived from *pendo* to weigh, or else from the Latin *pecunia*, money. The early pennies of the Saxon kings are very rude, except perhaps those of the reign of Ethelred the Unready, probably owing to the energy of the great Dunstan. Perhaps we might suggest he was coining when he used the tongs on the Devil's nose. Even after the Conquest, when it might have been expected that the superior art of the Continent would have been introduced, the coinage still continued poor. Architecture, goldsmith's work, and the art of illuminating books were each and all carried to a high state of perfection, but coinage was neglected. Silver pennies still continued the only currency. Imaginary sums, the pound, the mark, the shilling, were introduced, each being equal to so many pennies, just as we speak of the guinea now-a-days, though no guineas are in circulation, but no coins of higher value than a penny appeared until the reign of Edward III. Then a great advance was made. Fourpenny bits were struck and the device was improved. Edward first assumed the words 'Dei gratia' since then on all our coins,—and from 1839 to George IV the words *Rex Francie*, king of France, occur, continued long after England ceased to own one foot of ground in that country. But the chief thing to be noticed is Edward's fine coinage of gold Nobles. The king is represented standing in a ship, and the device is extremely fine. His son too, Edward the Black Prince, issued coins called 'Pavillions' because he sits under a gothic canopy, with the Prince of Wales' feathers, assumed, with the motto *Ich Dien*, in commemoration of his having cut the feathers from the King of Bohemia's helmet at Crecy. It is extremely difficult to distinguish the coins of the three Henries, IV. V. VI. because of the small difference between them, but a new style arose with Edward IV. He issued coins called rials or royals valued at 10s. each, and also angels and $\frac{1}{2}$ angels, so called from the device—the Archangel Michael piercing a dragon with a spear. Edward IV. had an alchemist and announced that he would soon be able to pay his debts through the discovery of the philosopher's stone. Henry VII. first issued the sovereign and the shilling, with rich devices quite different from the ruder coins of previous reigns. In this reign Perkin Warbeck, the pretender to the crown issued coins with the curious motto 'Mene, Tekel, Phares.' One of the charges brought against Cardinal Wolsey was his having had his Cardinal's hat imprinted on coins. 'Also the said Lord Cardinal of his further pompous and presumptuous mind hath enterprised to join and imprint the Cardinal's hat under your arms in your coin of groats, made at your city of York, which

like deed hath not been seen to have been done by any subject within your realm before this time.' Henry VIII. debased the coinage to a frightful extent, and still more was it lowered by Queen Mary. This queen had her husband Philip put on her coins, facing her, which the poet Butler alludes to in the lines,—

"Still amorous, fond, and billing,
Like Philip and Mary upon a shilling."

But good Queen Elizabeth, chiefly through the London merchant Gresham, who founded the Royal Exchange, restored the purity of the currency, receiving back as 3½d. that which had been issued as 12d. On the silver pennies of her reign occurs the legend "*E. D. G. Rosa sine spina*," first adopted by Henry VIII., because in him were united the rival Roses of York and Lancaster, but perhaps revived by Elizabeth because she considered herself a rose without a thorn! Even during all the Civil Wars Charles I., greatly to his credit, maintained the purity of the currency, though he melted down all the fine old plate of the Universities to coin money, and almost all the noblemen and gentry melted down their plate for the same reason, and all the King's plate in the Tower was melted down by the Commons in 1644, so that good pieces older than 1640 are extremely rare in the country, and irreparable damage was done by this wholesale destruction. Very curious siege pieces were struck, among which may be noticed a diamond-shaped type coined at Newark. But the Commonwealth altered the style entirely. On the shillings of that time is a simple cross of St. George within a palm and an olive branch, with the legend "*The Commonwealth of England*." The reverse has two shields joined, which from their shape obtained for the coins of the Commonwealth the name of "*Breeches*." Such a great and clever man as Oliver would not overlook the coinage, but the opposition at the mint to foreign workmen was so great that he could not improve it so far as he wished before he died. Then the coinage of Charles II. reign is worthy of remark. His first issue bears the last portrait of a king in the costume of the day. His successors appeared in marvellous Roman armour, with a big wig on the top of their heads. Again in Charles' reign began the practise of the King's head being placed in the direction opposite to his predecessor's, said to have commenced through supposed aversion to the memory of Cromwell. Guineas were first issued, so called because coined out of gold brought from Guinea by the African Company. An anecdote about Charles may be worth mentioning. He is reported to have been very angry because the colonists of Massachusetts had coined money of their own, and to have threatened punishment. Sir Thomas Temple drew some of their coins from his pocket and showed them to the King. They had the device of the pine tree of that country, flat and

bushy at the top; Charles asked what tree it was. "O, your Majesty," said Sir Thomas, "that of course is the Royal Oak, which preserved your Majesty's life." So the King let them off, calling them "honest dogs." Gold was so extremely scarce in this reign, that among other laws it was enacted that no gold should be used in gilding carriages.

Since Charles II, many changes have been made at one time or another, but time presses, and as the coins of later reigns are comparatively common; you will be the better able to note for yourselves any curious points. I will just allude to the extraordinary legend on some coins of the Georges. It stands

M. B. F. ET. H. REX. F. D. B. ET. L. D. S. R. I. A. T. ET. E.
said to mean — M(agnae) B(ritanniae) F(ranciae) ET H(iberniae) Rex,
F(idei) D(efensor), B(ransvicensis) ET L(unenburgensis) D(ux), S(acra)
R(omani) I(mperii) A(rohi) T(hesaurus) ET E(lector).

Queen Anne was so modest that she would not let herself be represented with bare shoulders, but insisted on having a big fichu drawn over them. Also if ever you come across a penny of William IV.'s reign, preserve it, as they are extremely rare, because after they were coined it was found that they contained gold, so that all soon came to the melting pot.

And now I must close, but let my last words be "Go and collect yourselves."

CELL LIFE.

READ BY T. N. HART-SMITH, ESQ., MAY 13th.

THE subject about which I am going to say something to you to-night is not only, I hope, a very interesting one but also one of the most important with which the microscope deals. Any one who has ever looked at objects under the microscope and seen the marvellous sights there presented to our view in the vast new-world it opens to us, can easily imagine that there is no lack of interesting topics connected with its study. But when attacking many of these we are, Columbus-like, mere explorers: we gaze in wonder, but we often cannot explain, we are puzzled by the obstinate questionings that arise within us; and if we would test our *actual* knowledge and confine ourselves to that, we have not nearly so wide a range as one might fancy.

The structure of living objects, however, and the nature of the functions they perform is a question which has for some time wholly ceased to lie on the border-land of discovery, and has passed into the domain of science. In the middle of the seventeenth century the minute structure of animals and plants, began to attract the attention of microscopists. Harvey had about 1628 propounded his theory of the circulation of the blood. And this ere long received ocular proof when, in a frog's foot, the whole process was detected. The instruments at the command of scientific men were still very imperfect. It had only been in 1621 that double glasses began to be used, at the time of the discovery of the law of refraction. But experience led to improvements, and during the eighteenth century great advances were made. Former ideas were completely upset by the sight of new forms of animal and vegetable life, such as animals growing on stalks, or vegetables with the power of locomotion, and great interest was aroused as to this question of their structure. We may imagine the surprise of the first discoverers of the Hydra, a zoophyte closely allied to the sea-anemone, an animal which can propagate itself by buds like a plant—can produce afresh any part that may be cut away—can form any number of new heads by completing the halves into which the previous heads may have been slit—thus realizing the ancient fable;— can endure to be cut into fragments and will produce fresh individuals from each, can undergo grafting of two individuals together, head to head, or tail to tail, or even head to tail, not only without apparent injury, but with every indication of benefit from the operation. But now, when our instruments are so far more perfect in manufacture than those our ancestors possessed, we have passed the wondering stage and are able

to solve many difficulties they could not, though, as is the case with all branches of knowledge, without their efforts we should not be nearly so far advanced as we are. And our great progress has all been of late.

It was not till 1837 that the truth was distinctly stated as to the importance of the *cell* in the structure of every organism, a truth which has since received ample confirmation. Now an *organism* is a living being with a definite structure or inter-relation and inter-dependance of parts. Zoology treats of animals, Botany of vegetables, but they are both only branches of the science Biology, which treats of *organisms*, living beings, that is. A piece of flint has a certain structure, but it is dead, lifeless, and not produced by anything that has lived. It never had that curious inter-action of its parts, which is one of the signs of life; it never possessed organs, each performing its own functions; it is of one character throughout, and so it has nothing to do with Biology, as it is called, or in plain English the science of life. It belongs to the sciences treating of *inorganic* matter; organic matter is something very different. All organisms are built up of tissues of various kinds, and these tissues, as perhaps many of you know, are composed of masses of cells or little sacs, united together to form cell-tissue. These cells can be very plainly seen in an orange. Take one of the pieces into which an orange so easily divides, and remove the skin. You will see a number of little transparent bags, in this case filled with juice. But cells are of every conceivable shape. There are nerve-cells, with long protruded arms, long closely packed cells, as in the fibres of hard wood, round cells, such as you can see in the pith of elder, star-shaped cells, as in rushes, and many others equally unique in form. The cells are the units, out of which the whole structure is built up. The animal or plant should really be regarded as an aggregate of innumerable individual cells, if, that is, we would investigate and understand its nature. It is the cell which lives, grows and has its history, and the development of the cell according to different laws which produces the trees and plants, the animals small and great around us. A tissue is a collection of cells governed by a common law of growth. The cells of fat—a tissue—develop in one way, those of hair in another, of skin in a third. Cells can be collected together in masses or lumps, as in the case of fat, or of fruits amongst vegetables, or in rows as in hair, or in the vessels which convey nourishment to different parts of the animal or plant. Or again in surfaces, of a single layer, as skin-cells. Or in bundles as in fibrous tissues. Even blood may be called a tissue: tissues are aggregations of cells of a special kind. They grow differently according to the different work they have to perform.

Now let us examine the cell itself and I will take a typical vegetable cell. Let us take the hair of a species of Stonewort (*Tradescantia virginica*). It is simply a series of distinct cells or sacs; if we take one of them, we see

a sort of little bag containing a gelatinous stuff and with it something more liquid. This viscid substance, which in very young cells is often without its enclosing bag, is called protoplasm, first matter, that is, and the first thing requisite for the growth of an organism and essential to all forms of life. In general it is granular, and contains large particles of starch, or globules of oil. The liquid is called the cell-sap. It helps to nourish the protoplasm and oozes through and about it, but in a full grown cell is generally found towards the centre. It contains in solution amongst other things the mineral products taken up in solution from the soil, colouring matters, and gums. Outside of all is a hard cell-wall, composed of a substance called cellulose, which is made up of the same constituents as starch, though not in the same way. It is in a pure state in the hairs of cotton. This is distinctive of vegetable cells. Towards the centre is usually seen a dark body called the nucleus, which we may think of as the heart of the cell. It is the centre round which the cell is formed. When a cell has grown big enough and become capable of sub-division, the means by which new cells are often formed, it is the nucleus which divides, and round this doubled centre appear two cells side by side. The protoplasm is an albuminous substance—if you recall white of egg, that is an albumen—composed of the four elements carbon, oxygen, nitrogen and hydrogen, which enter in different ways into all living matter. Under the microscope this protoplasm can often be seen moving and working about and in full-grown cells collecting in one or more parts of the cell. A good microscope will show the little granules in it. Grains of starch are to be seen chiefly in plant-cells as in those of the potato and pea. Starch and sugar are both vegetable products. Some cells have grains of fat in them, such as those of the seeds of the castor-oil plant. But the most important of all are the little green grains in the surface cells *only* of most plants, and to which plants owe their green colour. These are called *chlorophyll* grains. They contain iron and are coloured green by the action of the sun's rays. If you keep a plant without light, these granules remain white. It is bleached. If you wholly prevent the plant from getting any iron, which it absorbs from the water that reaches its roots, they will again be white. They are formed by the protoplasm and remain embedded in it. They are not found in all plants, as for instance in fungi, nor are they in the deeply seated cells, which the sun-light does not reach. In autumn as the leaves die, these granules get dissolved, and the same happens when fruits ripen, and turn to yellow and red. It is by means of these granules that plants perform their great office of taking the carbon out of the carbonic acid gas in the air which percolates around them. In this way plants are great air-purifiers. Carbonic acid is carbon and oxygen. The carbon they so to speak digest. Carbon is a necessary element in the food of all living

belong. The oxygen they give back, under the influence of sun-light, but by night this process ceases. By night plants drink in oxygen, just as we do when asleep. A certain amount of oxygen is always necessary to them as it is to us, but by day there is in the way I have described a surplus which they give back. Without oxygen the protoplasm dies; it ceases to undergo the movements above-mentioned, exactly as happens if it is dried up by a high temperature (above about 125 F.) or frozen by a cold one. Plants may thus be said to breathe—when they imbibe carbonic acid and give back oxygen—to digest, when they assimilate carbon, and to have at night their period of sleep. There is this difference in the case of animals that it is the carbonic acid gas that they breathe out, and though they require carbon, they could not get on with it in its gaseous form. They need more solid food. If we reflect that the carbon in a plant is about half its dry weight—water is of course far the largest constituent, but when that is dried off, as say in a preserved specimen—we shall have some notion of the amount of oxygen thrown off for our use by plant-breathing.

We have now some idea of what each cell, of which a plant is composed, is doing, and how each cell has its own duties to attend to, according to its position in the plant-body. The microscope, however, has revealed to us the fact that there are such things as living independent individual cells. Let us consider one or two of these, and I will still speak of a vegetable cell.

In the flower of every plant, carefully placed and protected, is a single cell, where the seed or seeds are developed. Each seed grows from a single cell. The little grains of dust, the pollen of the flower, as it is called, are each single loose cells, whose duty is to fertilize this seed-cell. The innumerable spores which fall from the gills of a fungus, from the back of a fern or the little red flower-stalks of a moss, are each simple cells. But they do not pass their whole life in this individual state. Turn, however, to the cells of the yeast plant. What we call yeast or barm is a substance which produces fermentation in matters containing sugar. If added to the juice of the grape, for example, the mixture disengages gas bubbles and becomes frothy. It gradually loses its sweetness, and when distilled there results a light fluid which we call alcohol or spirits of wine. If the yeast be first boiled, there is no fermentation: if it be carefully filtered through porous earthenware there is no fermentation, though a good deal of its liquid part oozes through. Nor is there any fermentation if the liquid be sealed from the air and kept from all contact with yeast in any possible shape. The air carries yeast germs in profusion, but if filtered through cotton wool can never induce fermentation. By such observations and experiments it has been discovered that yeast is really a mass of little bodies, more or less round and transparent, so small that even under the microscope they cannot be seen without a very

high power. They seldom exceed $\frac{1}{100}$ of an inch in diameter. Each of these is an actual cell. They have a thin but tough cell-wall, the presence of which points to their being of vegetable nature, consisting chiefly of cellulose. This sac contains protoplasm, which towards its centre is clearer and more watery. Present in it are the four elements C.O.N.H., also fat and water, and certain mineral matters. These four elements are the most important constituents of all living substances, the bricks or stone-work as it were, out of which they are built. Let us consider how they are procured.

Each yeast-cell or *Torula*, the name given to the yeast-plant, grows with marvellous rapidity as soon as ever it comes in contact with any solution containing sugar and the requisites for its nourishment. Very quickly is the protoplasm seen to swell and burst its cell-wall. New cells grow out of the old ones, forming separate individuals which detach themselves or cohere together forming long strings, which give yeast its peculiar appearance and consistency. In this way one *Torula* will produce millions in a very short time, and these little germs can be dried and kept for a long period without losing their vitality. For this enormous development fresh protoplasm is necessary. There is no protoplasm in the juice of the grape, but its elements are present, and out of the liquid each little cell has the power of abstracting the various elements it requires, and of kneading them together into new combinations, which we call by different names, protoplasm, cellulose and fat. It is only living things which have this wonderful power of re-arrangement. Crystals grow by taking from the solution substances like themselves, which are added externally. Living bodies absorb internally things unlike themselves, which they re-arrange and assimilate. An animal requires organic matter, that is matter which has lived; a vegetable can get on with its food in the form of gas.

This little yeast-cell needs no starch apparently, and no green colouring matter. Unlike the vegetable kingdom too it gives off not oxygen, but carbonic acid during the process of fermentation, just as animals do when they breathe; the sugar is broken up into alcohol and carbonic acid, and the latter is driven off. But yet it is a plant. All plants really absorb oxygen, but because green plants give off more than they absorb, they seem not to do so. Lichens and fungi are more like our yeast-cell, destitute of chlorophyll. But, though to draw a hard and fast line between animals and vegetables is impossible, though nature knows no gaps or divisions, the *Torula* is certainly a vegetable, for this reason,—No animal could extract its nourishment out of materials like a solution containing sugar. Plants, however, can do so. They actually live on air and water and what they contain, getting carbon from the air, oxygen from the air and from water, nitrogen from

ammonia in the earth conveyed by water to the roots—this is why manure is so invigorating to plants—hydrogen from water, and mineral matters carried in the water. We should find this poor food. It is possible to grow a plant entirely in water, if we dissolve into it certain necessary mineral matters always present in the soil.

The Torula then is a plant, an unicellular plant, and a type of what every possible plant springs from and begins by being. And knowing this we can understand how each cell in a plant, though a part of a great whole, can be said to have its own individual existence and duties. A plant is a collection of plants in itself. So much about a one-celled plant, and about vegetable cells collected into tissue. Now let us turn for a few moments to animal cells, and take first a typical instance of an animal tissue-cell.

The blood of any of the higher animals appears at first sight to be a fluid of a red colour, but it is none the less a tissue, if not in quite the same sense as a leaf-fragment or a piece of muscular fibre is a tissue. It is composed, as they are, of numberless cells or *corpuscles*, only they do not cohere together in this case by their walls. They are distinct one from another and float about in a liquid called the *serum*. We see here more clearly how the cell is the unit of all living structures. These blood cells are of two kinds, one colourless and of very varying shape, the other bright red when pure, and oval or circular, in many cases with a somewhat depressed centre like a double concave lens. The first thing we notice is the absence of any cell-wall, such as plant-cells have. Instead of this there is merely a thin envelope like the film of a soap-bubble. These cells contain protoplasm, as before, with granules of fat, but no starch. The colouring matter in the red corpuscles, which are by far the most numerous, corresponds to the chlorophyll or green colouring matter in plants. It contains in the same way a large proportion of iron—more than any other constituent of the body. A French savant is said to have been able to construct a mourning ring from the ashes of a departed friend. These little corpuscles in the blood effect the exchange which is necessary to all life; they give off carbonic acid produced by the waste of the tissues in exchange for oxygen, which they store up. As they circulate about the body, they supply this oxygen to the cells which abut on the arteries, until their treasure is expended, and they are charged with carbonic acid in its place. About the colourless cells we know less: they are as a rule much smaller and far less numerous than the red corpuscles. In human blood they exist in the proportion of about 1 to 300, but this varies, as after a meal they are far more plentiful than before one. They have the peculiarity of continually changing their form, but in constitution and contents they are very similar to the red

corpuscles with the exception of the absence of the colouring matter, and the presence of a nucleolus which is not found in their companions.

It is uncertain what these colourless cells have to do, but in various ways they must contribute towards keeping up the quality of the blood, and many think that they directly support the number and activity of the red cells. At any rate each cell is a living unit; you know how blood coagulates after being drawn from the body, how it separates into a clear liquid and a red gelatinous mass. This very power of coagulation shows that it is alive and has vital force of its own, if incapable of independent existence for any length of time. When blood coagulates, its cells die, and the corpuscles collect themselves into rouleaux or bundles like groups of sovereigns placed face to face ready for doing up in paper.

I want finally to take one other kind of cell, and this time a single individual animal cell, one that never develops other cells, or ever forms a portion of a larger whole, but lives in solitary contentment.

It is very difficult to imagine an actually living animal composed of a single cell. A highly organized creature, such as man, is endowed with various organs, each differing in structure and performing different functions. No part is repeated, and none can therefore be dispensed with. Let any organ—the lungs—the stomach—the veins cease to perform its functions, the whole body becomes immediately diseased and suffers from the affection of any one of its parts. And the higher the organisation of the animal the more highly strung are its nerves and the less capable is it of restoring lost parts. An animal however, ranks low in the scale of creation if it has but few organs, and these often similar and doing similar work. Think of a worm, whose body is made up of many similar repeated segments, or a star-fish, which can lose two or even three of its limbs and yet get on capitally with those left to it, while the lost ones are being grown afresh. Obviously therefore a one-celled creature must rank very very low indeed. Under the microscope we meet with innumerable creatures of a very low type. The large class of Infusoria, so common both in fresh and salt waters, and so-called from their frequent appearance in infusions of hay and various other animal and vegetable substances, are often little more than single cells, in which the protoplasm has undergone certain changes, without any division of the cell wall. Many of them can be dried and wafted as dust through the air without destroying their vitality, and they increase with extraordinary rapidity. Many of them like the Bell-animalcule which usually fixes itself by a long contractile stalk to water plants or to the legs and bodies of water animals, are provided with numerous cilia or little hairs, by which they can paddle their way about or create a current which will bring them for food whatever the water may contain.

But we can go even lower than this—the *Proteus-animalcule*, or *Amoeba* is a very tiny creature which is nothing more or less than a particle of jelly. It is occasionally found in stagnant water and is of very variable size. But its greatest peculiarity is its power of incessantly and rapidly changing its form, without which one would scarcely credit it with life. As it moves about over water plants, it can thrust out feelers or masses of its own substance apparently from any portion of its body. With these it seizes, surrounds and digests its food, thereby turning any part of its surface into a sort of temporary stomach.

The centre of this jelly-like mass contains granules—sometimes being portions of undigested matter—and is semi-fluid, while towards the surface its consistency is firmer and more transparent. It scarcely has any envelope, so thin is the external film, if this term even can be given to it. Imagine something so fine and yet so tenacious as to allow a rod to be passed into and through it, without causing it to burst, the walls recovering their continuity, as soon as the rod be drawn away. It is in this way that we can understand how, without mouth or any other orifice, solid matter can be taken in or thrown out when required. In some cases a peculiar phenomenon occurs. A clear space is seen below the surface, which rapidly increases and approaches the outside. In an instant it bursts and disappears, and then in a few moments comes a second, which repeats the process. Nothing is known about this, though probably it is a contrivance for ejecting superfluities and carrying water through the creature's substance. As with all cells oxygen is necessary for their existence: without it the protoplasm of which they consist, will die; and the waste in the shape of carbonic acid, which they give off, cannot be replaced. They are extremely like the white corpuscles in the blood, which also undergo the same peculiar changes of form, hence called "amoeboid," and acquiring for this animal, the *Amoeba* (*ἀμύβω*), the name of *Proteus-animalcule*.

Now it is not by its power of locomotion or contraction that the *Amoeba* has any undoubted claim to be an animal. These powers often are distinctive, but are not conclusive, when we deal with such low forms of animal life. There are vegetable substances which are able to move from one plant to another and there are hosts of creatures which are being alternately handed over from the animal to the vegetable kingdom, and then recalled. As I said before, there is no fixed line of demarcation, What, however, marks the character of the *Amoeba* is the absence of any cell-wall or enclosing sac, and above all its inability to live without its albumens and other substances wanted to replenish the protoplasm being ready made for it. It cannot, like vegetables, get them out of the air, or recompose them from inorganic substances. Thus plants, obtaining their nourishment by

absorption do not possess or require anything of the nature of a stomach. And even such broad statements are not universal; for there are carnivorous or flesh-eating plants.

The conclusion which I wish to draw from all I have been saying is this, that we must not suffer ourselves to be led away by terms or scientific nomenclature, but try to understand that such things are really artificial, however justifiable, and that Nature is a harmonious whole. We talk as if the distinction between animals and vegetables was much greater than it really is. We call those who are learned about them by different names, Zoologist and Botanist, as if they studied very different subjects. And no doubt they do; but yet the more we learn, the more we see that at bottom all living creatures are alike. They resemble each other—animals and plants—both in structure and in origin, and if we would understand something about that mysterious thing we call their life, we can only do so by investigating this structure, and learning about their parts. It is not enough to go out and pick a nosegay, nor to make a collection of butterflies; if we really mean business we must think and compare, and look not for obvious differences, but for the more important if obscurer points of resemblance.

PLANT DISTRIBUTION,

READ BY F. E. THOMPSON, ESQ., FEB. 26TH.

THE subject which I have chosen for this evening presents two great difficulties. In the first place it is as extensive as the world itself, and can only be treated to-night in a sketchy and superficial manner. In the second place it must deal with a good many unfamiliar technicalities, however popular the treatment, technicalities which cannot be elucidated and rendered interesting by illustrations and specimens. If we were at Kew, we could enter the Palm house, the great Fernery, and the "Victoria Regia" house, and there move about in the tropics. We could then visit the sub-tropical regions of the Cactus-house and the smaller Fern-house. And afterwards we could cool ourselves down in the temperate and sub-arctic herbaceous grounds and shrubberies. And, if it were late spring or summer here, I could bring many specimens of our wild flowers which would illustrate their representatives in regions warmer or colder than Great Britain. But beyond a map and a blackboard, and a few clumsily printed sheets, I have no means of appealing to your sight and imagination. I must beg you to believe that the subject is as fascinating and fruitful as the treatment is uninteresting.

Plants are divided into Orders, Genera, and Species. We can pretty easily explain these terms. If you pick three very familiar flowers, groundsel, daisy, and thistle, the resemblance will soon become obvious to an untrained eye. Examine them with a little attention and you will see that each so-called flower is a group or cluster of small flowers growing closely side by side on a common head. These three plants, from their structure, are said to belong to the order of Composites. To this order belong many well-known garden flowers, Cinerarias, Asters, Chrysanthemums, and so on. Groundsel, Daisy, Thistle, Cineraria, and Aster are different *genera* of the order of Composites. Each *genus* again contains several species. Thus in Britain there are about a dozen species of groundsel, very many more species of thistle, and so on. Excluding plants of the lowest forms of life, such as sea weeds, funguses, lichens, and mosses, botanists have observed from 100,000 to 120,000 species, belonging to about 10,000 genera, and to 200 or 250 orders. Within the tropical regions of the world there grow upwards of 40,000 species; within the arctic circle 800, i.e. only one-fiftieth of the tropical proportion. In Spitzbergen there are 107 species, in Iceland 400, in Britain some reckon 1300 some 1700, in France with Corsica 3600, in Tuscany 2800, in Naples 3150, round the Mediterranean basin 10,000, at the Cape 9000. Thus the number of species differs enormously in different

parts of the earth's surface. The first point, therefore, to consider is (1) the causes of this geographical distribution of plants; (2) the distribution itself.

The chief causes on which the distribution of plants depends are (1) climate, *i.e.* heat and moisture; (2) the influence of animals, especially man.

I. CLIMATE.

When we speak of climate we first think of the heat of a country. Now the heat of any given country depends (1) upon its *latitude*, (2) upon the *distribution of sea and land in its vicinity*, (3) upon the *height above sea level*. A word on each point.

And (1) with regard to *latitude*. A circle round the globe is divided into 360 degrees. From pole to pole, a half circle, there are 180 degrees, from pole to equator 90. Each pole is marked at 90, the central line between at the equator being marked at 0. As the earth revolves round the sun upon its axis, *i.e.* upon an imaginary line drawn through the centre from pole to pole, it shifts its position towards the sun daily. At our midsummer the sun is directly overhead and opposite a line $23\frac{1}{2}$ degrees N. of the equator, which is called the Tropic of Cancer. At our Christmas it is opposite a line $23\frac{1}{2}$ degrees S. *viz.*, the Tropic of Capricorn. The tract between these two lines is called the *Tropics*. Within these two lines the sun at mid-day is overhead all the year round. Hence the heat and length of days which we in the northern half of the world get at midsummer, and the southern half at Christmas. [Hence the summer of Britain is the winter of the Cape, and *vice versa*.

The earth's surface is divided by geographers into three zones of latitude and of heat. First the *torrid zone* extending on both sides of the equator to $23\frac{1}{2}$ degrees North and South: secondly the *temperate zone* from $23\frac{1}{2}^{\circ}$ to $66\frac{1}{2}^{\circ}$, *i.e.*, $23\frac{1}{2}^{\circ}$ from the pole: thirdly the *frigid* or *arctic zone* from $66\frac{1}{2}^{\circ}$ to 90° at each pole.

Roughly speaking, in continental countries, one degree of latitude further north means one degree lower of average annual temperature. This calculation, however, of an average annual temperature is not a simple matter of latitude. The *average of the tropics* is from 75° to 82° , at the *poles* it is assumed to be *zero*. But you could not put your finger on any spot at latitude 45 and state that the average annual temperature was from 37° to 41° . Many modifying circumstances come in, such as altitude above sea level, distribution of sea and land, which I shall soon speak of. And in our Northern Hemisphere the Gulf-stream raises our British temperature 10° throughout the year, thus making us as good as 700 miles farther south. When I come to speak of the next point I will give the average temperatures of several places on the earth's surface.

(3) In the second place the heat and cold of a country depend to an appreciable extent on the distribution of sea and land in its vicinity. The sun's rays act upon land and water in a very different way. Under a bright sun the surface of the land becomes intensely heated, but only the surface. And this heat is soon given off again, so that land is not a reservoir of heat. But with water the case is far otherwise. The sun's rays strike deep down into it, and there are absorbed, so that the heat engendered can be emitted for subsequent use. At a certain depth, varying in different parts, the sea is of an uniform temperature of 39° all the world over. At the equator this temperature is at a depth of 7200 feet, at latitude 56, the parallel of Edinburgh, it reaches the surface, and there the temperature is uniform at all depths; at the Arctic circle it has again fallen to a depth of 7000 feet. That is to say the heat increases in the equatorial waters from below upward to the surface: in the arctic waters it increases downwards from the surface to below. At the equator the surface is the hottest part of the sea, varying between 85° and 80° , the former being the mid-day, the latter the mid-night temperature, all the year round. But as you advance to the temperate zones, where the heat of the air varies greatly according to the season, the influence of the sea on climate is very marked. The sea absorbs heat in summer and emits it in winter. It absorbs heat during the day and emits it during the night. And thus a sea-side climate is more uniform than an inland climate. It is neither so hot in summer nor so cold in winter, neither so hot by day nor so cold by night. Thus we get the important distinction between *insular* and *continental climates*. Great Britain affords a good illustration. On the W. coast of Ireland, in Cornwall and Devonshire, where the land lies nearest to the great mass of the Atlantic, the average temperature is 51° — 52° , the difference between July and January being only 20° — 21° . On the East coast of England, which is warmed by the much smaller reservoir of the German Ocean the average temperature is appreciably lower. At Greenwich, inland, the average is 49° , the difference between July and January 25° . In the northern island of New Zealand, lying between parallels 34° and 42° and so corresponding to Spain, the annual average is 52° , the difference between July and January 14° . At Cape Town, lat. 33° the annual average is 59° , the difference between July and January 16° .

Now turn to a continental climate. St. Petersburg is in lat. 60° , the annual average $38\frac{1}{2}^{\circ}$, the difference between July and January 46° . Moscow lat. 55° , the average is 39° , the difference 54° . Montreal lat. 45° , parallel with Bordeaux, the average is 44° , the difference 54° . Hudson's Bay on N.W. shores lat. 60° , the average is 11° , the difference 70° . At Yakutsk in Siberia on the Lena lat. 62° , the most extreme instance of a continental climate, the cold of January is 40° below zero, in July 61° above, the difference being 101° .

How important a difference in temperature of day and night is produced by sea may be shown by a single night's reading. Christmas night, 1860, was remarkable for unusual severity of cold. At Nottingham the reading was 8° below zero, York 4° below, Manchester 3°, Shields 6½°, Whitby 10°, Scarborough and Liverpool 16°, Ventnor 24°, Helstone (Cornwall), 32°. Sea influence extends but a few miles inland.

The following table will illustrate what has been stated.

1.—Tropical Zone—	Lat.	Jan.	July.	Diff.
Gold Coast	5	79	77	2
Nubia	17.23	68	96	22
Madagascar	11.25	79	72	7
Mocha	12	77	90	13
N. Brasil	0	79	77	2
2.—North Temperate Zone—				
Europe and Africa—				
Barbary	30.36	50.59	77.90	27.31
Spain.....	36.45	41.50	68.77	27
France	43.50	32.41	64.74	32
England	53.55	32.41	59.63	22.27
Iceland	64.66	32	50	18
Archangel.....	64	5	59	54
Asia—				
Palestine	31.33	50.59	80.85	26.30
Pekin.....	40	26	77	51
Yakutsk	62	40	61	101
America—				
New Orleans	30	59	82	23
Baltimore	39	32	78	41
Montreal	45	18	70	52
Hudson's Bay	65	26.22	44.55	70
3.—South Temperate Zone—				
Valparaiso	33	68	54½	13½
Buenos Ayres	35	72	54½	17½
Cape Town	35	75	59	16
New Zealand, N....	35.42	59	45	14
„ S.....	40.43	55	41	14
Cape Horn	55	42	34	8
Frigid Zone—				
Spitzbergen	0	5	40	35
Tornea, Lapland	0	5	59	54
Arctic Siberia	0	40	54.59	97

With regard to the Northern and the Southern hemisphere a glance at the map shows how much more land there is in the northern than the southern, 28,000,000 of square miles as against 4,000,000. In the northern hemisphere there are accordingly many greater variations of climate than in the Southern.

Thirdly, heat and cold depend on altitude above sea level. The higher we climb the rarer the atmosphere becomes, the more we interpose the denser portion of the atmosphere between ourselves and the heated surface of the earth which we are leaving, and therefore the greater the altitude above sea level the less will be the heat. It has been calculated that for every 300 feet we ascend, the decrease of temperature is 1° Fahrenheit. Now we have already seen that a degree of latitude means a degree of temperature. Accordingly at the top of a hill 300 ft. high, at sea level should have the same temperature as a place one degree or 70 miles north.* The top of *Ætna* in the Mediterranean basin, lat. 38, has the same average temperature as a place at sea level on the arctic circle, lat. $66\frac{1}{2}$. And the heights of mountains in the tropics in this way pass into the arctic regions. And thus, irrespectively of latitude, the Himalayas, the Andes, the Alps, the Rocky Mountains, the Pyrenees, the Sierra Nevada, Lebanon and Ararat all belong to the Arctic zones of perpetual ice and snow.†

Let us now see how far we have advanced. Plants are distributed over the earth in varying proportions. These proportions depend upon three chief natural causes, latitude, distribution of sea and land, and height above sea level. If the presence of the sea made no difference, if there were no mountains in the world, we should have to think of latitude alone. Still latitude is the most important consideration, the other two may be regarded as modifying circumstances. Accordingly proceeding from the equator to the poles and to the mountain tops the earth's surface is divided into

- (1) The Torrid or Intertropical zone.
- (2) The Temperate zone, which is again subdivided into (a) warm temperate or subtropical, and (b) cool temperate.
- (4) The Arctic Alpine or Frigid Zone.
- (5) The Zone of perpetual snow and ice.

A detailed table of the first four zones will be useful for reference.

* Our height at Marlborough is 450. Accordingly we should have a temperature like that of an inland spot 105 miles to the north of us.

† The line of perpetual snow in the Himalayas is from 15,000 to 17,500 above sea level, that of the Pyrenees 8,000, of the Alps 7,000, in Iceland 2000. In the Andes corn growing ends at 12,000 to 13,000 ft., in the Himalayas at 10,000 to 12,000, in the Alps and Pyrenees at about 5000, in Britain at 1500 to 1800.

- (1) The Intertropical zone: from $23\frac{1}{2}^{\circ}$ N. to $23\frac{1}{2}^{\circ}$ S. of equator including hills to about 5000 ft. in height. Average temperature 75° to 82° . Species found, 40,000.
- (2) Warm Temperate, or Sub-tropical zone, from $23\frac{1}{2}$ to about 45° (Bordeaux, Turin, Belgrade) in Europe, and 35° in America and Asia. Average temperature, 75° to 60° or 55° . Species found, 40,000.
- (3) Cool Temperate zone, about $\frac{1}{3}$ rd earth's surface: to $66\frac{1}{2}$ or $23\frac{1}{2}$ from Pole. 15000 species.
- (4) Arctic Alpine zone, from arctic circle at $66\frac{1}{2}^{\circ}$ to the region of perpetual snow and ice, including tops of all snow covered mountains. 800 species.

I will now proceed to speak of the flora of each zone, deferring the question of the influence of animals on plant distribution, as it presupposes the mention of plants.

There are few of the 200 or 250 orders which thrive vigorously in all the four zones. Some there are such as Compositae, Rosaceae, Gramineae, Ferns, Leguminosae, and others. The same may be said of the 10,000 genera. Senecio, Rubus, Polygalum, Gnaphalium, Plantago are cosmopolitan. The most widely spread and most independent of heat of the species are found among the Aquatics, like Potamogeton lucens, shining pond weed; Potamogeton pectinatus, fennel-leaved pond weed. A few common land annuals and perennials occur in all four zones, such as Cerastium glomeratum, Clustered Mouse Ear, or Chick-weed; Capsella Bursa-Pastoris, Shepherd's Purse; Sonchus asper, arvensis, oleraceus, sow thistles, rough, corn, and sow thistle; Plantago major, greater Plantain; Nephrodium filix mas, male fern; and Athyrium filix femina, lady fern; but they are not fairly at home in the tropics. Pteris aquilina (bracken), is abundant on the banks of the Amazon, and is found in Lapland. Many water plants, perennial herbs, and annual weeds are quite at home in the three warmest zones, such as Typha angustifolia, Lesser Bullrush; Lemna Minor, small duck weed; Drosera longifolia, long-leaved sundew; Oxalis comicalata, yellow wood sorrel; Solanum Nigrum, garden nightshade.

It appears that at least three-quarters of the known species are found in the two warmest zones.

Luxuriance of vegetation however does not necessarily imply a great variety of species, nor, conversely, does poverty of vegetation imply a scanty variety of species. Cape Colony is a good case in point. This district is about a quarter of the size of Europe, it consists largely of grassy plains and barren sandy deserts, yet it produces nearly as many species as the whole of Europe. Ireland, again, has a luxuriant vegetation but a small flora, only 1000 species. From the equator to about parallel 40° there is

no sensible diminution of species. It is not till we cross the limit between the warm temperate and the cool temperate zones that winter acts as a real check to plant growth. From this point to the poles the diminution of species sets in steadily.

(1) The Intertropical Zone is a belt 8900 miles broad. About two-fifths is land. Of this land half is included in Africa, the rest in America, Asia, Australia, Polynesia. In tropical Africa and in the heart of tropical S. America there are vast tracts of barren desert; on the Gold Coast, in Senegal in Africa, in Ceylon, the Bombay Ghauts, the Neilgherries, Burmah, Malay, Java, Borneo, Sumatra, Polynesia, the banks of the Amazon and its sister waters, Panama, Nicaragua, West Indies, the Brazil Coast, the fulness and richness of vegetation is unmatched in the world. Here there is no check at any time to vegetation. There is always heat enough to support growth. What variation there is in heat is caused not by winter and summer but by day and night.

The chief characteristics of tropical vegetation are

- (1) The rank luxuriance of forest growth. Huge green trees which spread a canopy impenetrable by the sun are bound by interlacing woody climbers, while the fallen trunks and rocks are overgrown by climbing Ferns, Aroids, Orchids, and other Epiphytal plants.
- (2) The great proportion of trees and shrubs as distinct from herbs. Even the annuals which spring up in the rainy season are half shrubby.
- (3) The variety of the forest growth; climbers and epiphytes are so mixed up that it is difficult for a collector to see to which plant a fallen fruit belongs.
- (4) The absence of lawns, mosses, and lichens.
- (5) Arborescent ferns and monocotyledons such as Palms, Bamboos, Tree Ferns, and Pandani, the appearances of which are so characteristic of tropical scenery.
- (6) Climbing shrubs in the forest, a species of growth almost peculiar to this zone, such as the Paullinia, the Ficus, the Bignonia.
- (7) Several peculiar types such as Peppers, Begonias, Gingers, Epiphytal Orchids, Figs.
- (8) On muddy sea shores groves of interlacing trees with broad entire (coriaceous) leaves, Rhizophora, and Barringtonia.

About 57 orders are peculiar to the Tropics. This zone is also remarkable for certain plants cultivated for human use. Farinaceous roots, the Yam, Arrowroot; Sago, Palm; grains such as Rice, Maize; nuts, Cocoa Nut; fruits, Mango, Guava, Bread Fruit, Banana, Date, Tamarind, Jujube; dyes and scents, Vanilla, Gamboge, Indigo, Logwood; Oil Plants, Oil Palm,

Castor Oil; Coffee, Cocoa; Spices, Sugar, Nutmeg, Cloves, Cinnamon, Capsicum, Cotton; Rosewood, Teak, and Ebony.

(II) The warm temperate or Subtropical Zone. The tropic of Cancer runs through the middle of Mexico, North of the West Indies, Morocco, between Egypt and Nubia, from Kurrachee to Calcutta, Canton, Formosa, and to North of Sandwich Isles.

The Tropic of Capricorn runs from Chili to Rio Janeiro, North of Natal, Australia, South of Friendly and Society Islands.

Its two belts make up about one quarter of the earth's surface. The land is much more broken up than the tropical zone, and therefore more influenced by water. Here there is a sensible difference between summer and winter, but winter is never severe enough to check plant growth at any time. For instance, in the plain of the Ganges and the African oases, wheat is grown during the three winter months, and cotton, maize, and indigo in summer. This zone is drier than either the tropical or the cold temperate zones. The rains, as for instance in the Mediterranean, have a tendency to be periodical. When we compare this zone with the tropics the chief difference consists not in diminution of species, but of luxuriance of individual plants: as many species, 40,000, occur here as in the tropics. I have spoken of the variety of the Mediterranean and the Cape flora.* Sub-tropical Australia and New Zealand yield 7000 to 8000 species.

Sub-tropical Vegetation presents the following characteristics.

- (1) A wonderful variety of bushes, and low growing trees compact of growth, with small stiff leaves, Cistaceae, Labiatae of the Mediterranean, Myrtaceae, Rutaceae and shrubby composites of the Southern Hemisphere, Brooms and Heaths.
- (2) Terrestrial Orchids.
- (3) Gradual exit of Tree Ferns, Palms, Dracaenas, Epiphytal Orchids, Peppers, and Figs.
- (4) Entrance of the cool temperate plants, Umbelliferae, Cruciferae and Coniferae.

* From the Mediterranean basin we get many of our most beautiful garden flowers, Squills, the Flower-de-Luce (Iris), Dianthus, Arums. It is from this district that that grand tree the Eastern Plane, *Platanus Orientalis*, comes.

The Cape again is a store-house of garden flowers. Of succulent plants there are 450 species; of heaths 500, of bulbs 850, 170 being orchids, 160 are Irises, 110 Amayllids, 360 Lilies. The Cape Flora and South Australian Flora are fairly parallel, and they closely resemble each other either in identical or allied species. Thus of allied species the heath (*Erica*) of the Cape is represented by the *Epacris* of Australia. Australia, however, is far richer in trees, the *Acacia*, the Gum, and Mahogany trees, and the famous *Eucalyptus*. —Garden, January, 1878.

- (5) Larger proportion of terrestrial mosses, lichens, and annuals than in the tropics.
- (6) Entrance of sward-producing grasses, *Poa*, *Festuca*, *Bromus*, *Holcus*, *Agrostis*, *Anthoxanthum*.
- (7) Entrance of cereal grasses, Wheat and Barley; exit of Rice, Maize, Cotton, and Indigo.

The principal plants cultivated for human use on a grand scale are :—
Rice, Maize, Wheat, Barley, Millet, Lentil, Beans,

Fruits :—Vine, Fig, Pomegranate, Olive, Apricot, Peach, Orange, Lemon, Chestnut.

Saffrons, Gum Arabic Tree, Tobacco, Senna, Tea, Opium, Cloves, Cucumbers, Melons, Gourds.

Scented Labiates, Marjoram, Thyme, Sage, Basil, Lavender, Rosemary.

III. COOL TEMPERATE ZONE.

In this zone winter comes in as a real check to vegetation. In England the trees are bare for six months out of the twelve. On the Alps, at a height of 4000 to 5000 feet, vegetation lasts for 200 days out of 365, at St. Petersburg, at sea level, for only 130.

As we proceed towards the poles the number of species rapidly diminishes. France and Corsica together are about the size of Sweden. France and Corsica yield 3600 species, Sweden 1160. Naples has 8130 species, Iceland, about the same size as Naples, has 400. Tuscany has 2366; our three English counties Yorkshire, Northumberland, and Durham, together about as large as Tuscany, 1000. This zone, except in the heart of Asia, has been very well explored, and yields about 15,000 species.

The characteristics are—

(1) Trees with deciduous leaves, pines with long needle shaped leaves so constructed as to admit of the minimum of evaporation, herbaceous perennials which die down in winter.

(2) Smallness of the flowers of the trees. The floral type of the trees is low. The trees are generally incomplete, one yielding the fertile, the other the barren flower.

(3) The abundance of grasses which produce greensward and the general presence of grassy verdure.

(4) Greater proportion of mosses, and large lichens.

(5) The small number of trees in proportion to other plants, and the growth in great quantities of single kinds, such as Pine, Beech, Oak.

(6) The same with ferns, but this in insular climates only.

(7) The total disappearance of tropical forms such as Palms, Figs, Tree Ferns, &c.

In this zone the principal plants grown extensively for the use of man are

Cereal grasses : Wheat, Oats, Barley, Rye.

Fruits : Plum, Apple, Pear, Quince, Peach, Apricot, Cherry, Strawberry, Currant, Medlar.

Kitchen garden plants : Potato, Cabbage, Turnip, Beet, Bean, Onion, Leek, Mustard and Cress.

Hemp, Linseed, Veitch, Clover.

Before quitting the cool temperate zone a few words on our own islands may not be uninteresting.

Mr. Watson, in his great work, the *Cybele Britannica*, tells us that in Great Britain we have six distinct climates or zones of heat. In the three lower zones the cultivation of cereals and potatoes is practicable. The upper limit of the fourth zone has much the same climate as the arctic circle at sea level, and there is comparatively little land above this in Britain, since most of the peaks and ridges are to the north. Botanists differ as to the number of British species : Mr. Bentham at the extreme admits only 1285, Professor Babington raises the total to 1428. Taking the six zones in their order they are as follows :—

Infer-agrarian	...	...	...	1225 species.
Mid-agrarian	...	...	...	1070 „
Super-agrarian	...	...	...	760 „
Infer-arctic	...	...	...	298 „
Mid-arctic	...	...	...	244 „
Super-arctic	...	...	...	111 „

We have only one indigenous climber, the ivy. The Dog-rose extends from N. to S. Our commonest tree is the oak, the proportion of our trees to shrubs is small. One remarkable fact about the timber trees is that only one, the *salix*, reaches the mountains of tropical Africa and temperate S. Africa. Not one natural order, not one genus, not one species is peculiar to the United Kingdom. A particular sedge, *Eriocaulon septangulare*, grows in Britain and is not found in Europe, but it is a North American species.

IV. ARCTIC ALPINE ZONE.

800 species are found here, but of these 800 about 600, or 75 per cent., belong to the cool temperate zone, and accommodate themselves to the more polar districts. About 200 are peculiar to this zone. These observations, however, apply to the zone only when considered from the point of view of latitude. The "Alpine" plants of the Alps, Pyrenees, and Sierra Nevada yield 1000 species. The Alpines of the Andes reach to 8000. Thus we see that climate by latitude and climate by altitude do not correspond with methodical precision. In the case of tropical and subtropical mountains

many a straggler ventures upward from the luxuriant districts below. The explanation is obvious. In lands within the Arctic circle the difference is enormous between winter and summer. A brief summer of perpetual daylight and sunlight raises the snow-line. On the contrary the snow-line of an equatorial mountain hardly varies at all, all the year round. Consequently plants have a much longer period to flower. For instance in Spitzbergen there are about 100 species of the higher order, and they have to do all the work of growth, flowering and seeding within six weeks or two months.

The characteristics of this zone are—

- (1) Low herbaceous perennials. Trees and shrubs grow at sea level but fast disappear. The characteristic shrubs are dwarf and low-growing.
- (2) The almost total absence of annuals.
- (3) Also of plants grown for the use of man.

Plants characteristic of this zone are certain brambles, such as *Rubus Arcticus*, *Rubus Chamaemorus*, certain *Andromedas*, *Azalea procumbens*, and several willows, *salix*, *lanata*, *glaucæ*, *arctica*, *polaris*, *herbacea* and others.

Out of the 800 species only eight are absolutely confined to the arctic regions. Of the characteristic mountain alpine many are familiar such as *Ranunculus*, *Arabis*, *Draba*, *Potentilla*, *Saxifraga*, *Gentiana*, *Phyteuma*, *Veronica*, *Primula*, *Luzula*, *Campanula* and many another which has gladdened the eye of the tourist in his midsummer rambles in Switzerland or Tyrol.

Within the Antarctic circle there is no vegetation corresponding to the Arctic flower of the north. Not a single plant has been discovered within the Antarctic circle. Several cultivated plants are named *Antartica*, such as the *Dicksonia*, but they are misnomers.

At the beginning of this paper I spoke of Kew Gardens as providing homes for plants of the different zones. But of course the provision must be inadequate. No horticultural science can transfer to our climate the bright unclouded skies, the burning suns, the equal distribution of day and night, and the rich warm moisture, the regular rains, droughts, and winds of the tropics: nor on the other hand the snows, the long dreary stretches of winter and the brief nightless summers of sub-arctic climates.

Still less is there any chance of turning midsummer to midwinter in order to delude the plants of the Southern hemisphere. These last visitors steadily refuse to bloom in July when they have been accustomed to do so in January. They are not seduced to change their ancestral habits. Still we may see the plants themselves, and in the short period of a few hours and the short space of a few hundred yards roam from Peru to Australia, and from Spitzbergen to Patagonia. Let me warmly recommend any one who has a day to spare in London to go to Kew, and before entering the gardens to lay out

a well invested penny in a little book I hold in my hand, the Route Map and Index of the most interesting objects in the Royal Gardens, Kew.

I have come to the end of my time, but have not half got through my subject. Indeed I seem but barely on the threshold of it. Before concluding let me hint at certain points which have not been touched on. (1) The influence of animals, especially of man, on the distribution of plants, first pausing merely to notice as an illustration of the importance of the subject, how sheep have altered the flora of the Cape, and goats the tropical vegetation of St. Helena. (2) The way in which heat and cold influence plant distribution; some plants not caring for excessive cold in winter so long as they can ensure sufficient heat in summer, and some not requiring great heat in summer so long as they can avoid great cold in winter, (3) The distribution of rain and wind and its influence on plants, and the characteristics of moist-loving plants on the one hand and dry loving plants on the other.

This part of the subject would take us to Brazil, where we have a moist flora along the coast, the Regio of the Dryadum, running parallel with a dry flora in the interior, the Regio Oreadum. And (4) no survey of the subject is complete without glancing at the theoretical but most interesting inquiry how species have originated in different parts of the world, and how they have been distributed; how for instance we are to account for the same species occurring in two districts separated by thousands of miles, and how again one species in Europe will correspond to a sister species with slight varieties, but not essential, in America and New Zealand.

I should like to think, with your leave, when the days are warmer, and I can produce before your eyes some scores of specimens to relieve the dry catalogue of names with which I have burdened you this evening, that I may recur to this subject.

I am sorry that I have no pictures to put before your eyes. A good series would help us materially to appreciate these dry outlines.

I should like a series of landscapes on the walls around me. These would represent tropical scenery with its gigantic forest trees, its branching palms, interlaced with woody climbers such as Tacsonias and Passion flowers, and studded with epiphytal orchids. And probably the artist could not restrain himself from inserting a huge serpent hanging down from the branches of a Brownea, or a monkey swinging, or a bird of gorgeous plumage whizzing through the air; such scenes, Nature's Cathedrals roofed with thick green, as cheered the sick soul of poor Charles Kingsley on his last holiday. And then there should be a rainless sub-tropical scene from Mexico, with its dry air and soil, and grotesque pantomime-like succulents, its Cactuses, Yuccas, Agaves, Aloes and Echevarias, with Cereuses, like colossal

pumpkins, or enormously magnified sea anemones sticking out at right angles from the glistening rocks. And we should have a Siberian jungle of summer umbelliferae, enormous angelicas, and grasses, and willow herbs with a hog perhaps trotting along, as indifferent to the preternatural nettles which rub his rough flanks as to his lord and master the autocrat of all the Russias. Nor we should object to a broad expansive view of the magnificent Californian Sierras with their belted lines of conifers labouring, like Soracte, under their weight of snow. All this you must imagine on this chill spring evening when the fields are flowerless and the woods leafless, and so

Pardon, gentles all,
 The flat unraised spirit that hath dared
 On this unworthy scaffold to bring forth
 So great an object—
 O pardon, since a crooked figure may
 Attest in little space, a million.
 And let us ciphers, to this great account,
 On your imaginary forces work.

F.E.T.

"THE NATURALIST IN AUSTRALIA."

READ BY E. MEYRICK, ESQ., O.M., NOV. 11TH, 1880.

IN presenting this Society with some remarks on my impressions of nature in the Australian continent, I propose to confine myself strictly to facts which have fallen under my own personal observation, without launching out into any discussion of matters which may be gathered by any student from the usual text books of zoology and botany. I wish rather to convey to your minds some actual realisation of the aspect of the country, and of those peculiarities of detail which make it so interesting to every reflective person.

Every stranger is struck with admiration of the entrance into Sydney Harbour, which I believe is generally admitted to be the finest and most capacious harbour in the world. Passing in between precipitous cliffs of 300 or 400 feet in height, you enter a harbour twenty miles in length, but so extraordinarily indented with innumerable bays that at no part are you more than half-a-mile from shore; whilst I was assured by a Government Surveyor that the actual outline of the harbour measured 1200 miles; I do not vouch for the truth of this, but I think it is at any rate quite possible. Throughout a great portion of this the water is so deep and the sides shelve down so rapidly, that large ships can be brought up close alongside the shore. During subsequent visits to the Blue Mountains, I was enabled to understand the causes which have led to this peculiar and unusual conformation of the ground. The Blue Mountains are a range of hills running parallel with the East Coast, at a distance of about forty miles; they rise abruptly from comparatively level country to a height of about 3000 feet, and evidently mark the line of an old sea-coast, when the Continent was smaller than it now is. They are not properly mountains, having none of the contorted and disturbed strata which invariably occur in mountain formations, but are in fact a high sandstone plateau, sloping off gradually towards the interior, and cut into deep gorges by the descent of streams. These gorges form the peculiar distinguishing characteristic of the country; they are narrow and of immense depth, usually from 2000 to 3000 feet, with perpendicular cliffs on each side; and at the bottom flows a small stream, so inconsiderable in comparison, that it is hard to realise that it must have cut out the gorge for itself in the progress of countless ages. Such is however undoubtedly the case; and in the Cañons of the Colorado in the United States we have a well-known instance of the same type of country on a far larger and more imposing scale. In the Blue Mountains the valley of the Grose River is the one most often visited. This gorge is between thirty

and forty miles long, and has never been crossed, its precipices being insurmountable; it is now probably much wider than it used to be, from the falling away of the sandstone cliffs which form its sides, and which continually retreat, whilst at their feet is piled a long slope of the fallen boulders of rock, covered with a luxuriant clothing of tree ferns and forest growth. Nevertheless there are still many points where a leap forward would carry one down 2000 feet without touching the sides. The summits of these cliffs are crowned with the usual monotonous gum-tree forest, and there are a few waterfalls of immense height, but poor in effect from the scarcity of their water. Now in the case of Sydney Harbour we seem to have the remains of what was once a precisely similar gorge, though the depth is naturally greatly decreased by the deposition of silt and sand which is still going on; there is the same sandstone soil, the same characteristic river-like shape and precipitous sides. If the East Coast of Australia were depressed 2000 feet, the Valley of the Grose would become exactly such a harbour as Sydney now possesses.

I have mentioned the gum-tree forest, and it deserves to be mentioned first, for it is everywhere an almost universal feature. The arms of Australia have for supporters an emu and a kangaroo, but the gum-tree has at least an equal right to be retained for that service. Probably the gum-tree, or *Eucalyptus*, will not be familiar to any of you present; it is sometimes planted in England in mild situations, but will not survive a moderately severe winter, and never flourishes in any case. In the North of Africa it is grown freely, and appears to do well, but it is a native of Australia only. There are many different species, but their general appearance is much the same; in general shape much like a large willow, with somewhat similarly shaped but larger and broader leaves, which have the peculiarity of being hung vertically, so as to afford very little shade. Like almost all Australian trees, they are evergreens, and at certain seasons, instead of dropping their leaves, they shed their bark, which hangs from the branches in long strips. Some of them grow to an immense height; I have seen whole forests in which every tree was from 250 to 800 feet in height, rising like immense pillars without a branch for perhaps the first 150 feet; the space between them being principally filled with tree ferns and low bushes. Specimens have been measured exceeding 400 feet, and are the highest trees known in the world. These large trees are principally found in the damp valleys, whence they are continually stretching up towards the light; on the hill-tops they are always more stunted in their growth. They grow very rapidly, and have been known to attain the height of 100 feet in the first ten years of their existence. In estimating the age of these trees from the rings of growth in their trunks, it is necessary to bear in mind that in Australia two

rings of growth are formed in each year, instead of one as in England; this arises from the difference in the seasons; in Australia the tree grows during the spring, but is checked during summer by the dry weather, so that a ring is marked off; similarly it grows again during the rains of autumn, and is again checked in winter, whence the second ring. The gum-tree possesses the power of absorbing water in a greater degree than almost any other plant, and it is for this reason that it has made itself so universal in a dry country like Australia. It is necessary to kill the gum-trees on sheep farms in order to save the life of the grass; if there is dry weather the gum-tree takes away all the moisture from the grass, which inevitably dies in consequence. The blacks are accustomed to use the roots of some species of gums to quench their thirst, from their always containing water. The leaf is aromatic and contains an essential oil, which is variously scented in each species; some are like peppermint, and one has exactly the savour of the lemon-scented verbena, and is employed by the squatters of Queensland to flavour their punch.

It is hardly necessary to say that the Mammalia of Australia belong almost exclusively to the order of Marsupials, but I should like to call your attention to an inference which may be drawn from this fact, because it is one of a class which are now receiving much attention from students of biology. The exceptions to the rule of all Australian quadrupeds being Marsupials consist only of the wild dog or dingo, believed to have had its origin from a species of dog brought in by man, and therefore beside the question; and of the two remarkable animals known as the Ornithorhynchus and Echidna, usually regarded as forming together a peculiar order, the lowest of all the Mammalia. Excluding the imported species, we find then that the quadrupeds of Australia belong solely to the two lowest-organised groups, wholly or almost absent from all other zoological regions at the present day. Geology, however, informs us, by means of the study of fossils, that Marsupials were the first of Mammalia to appear upon the earth, and that they then occurred in many countries, at least, where they are now long extinct,—for example, in England. The only way of explaining their present monopoly of the Australian region is by the theory that the Australian Continent was at any rate once connected with the mainland of the old world, namely, when it received the progenitors of its present stock of quadrupeds; but that it has never been connected therewith since higher Mammalia have existed on the earth, otherwise some would have found their way into it, and in that case the less highly-organised Marsupials would doubtless have become extinct before them, as they have fared elsewhere. Nor can Australia ever have been completely or even in great part submerged beneath the sea since that period, or the Marsupials would have

perished without leaving descendants. In point of fact, we do find from other sources of observation that recent geological changes in Australia have been but small comparatively, and that from this cause, and from its isolation, it has preserved us several species of animals which serve as relics of remote ages.

Most people are familiar enough with the name of the kangaroo, but that animal is but a representative of his group, of which there are hundreds of other species in Australia. All have a more or less developed pouch at the breast, in which to carry their young, and it is very curious to see the infant kangaroo peeping forth from his place of concealment. Possums, native bears, native cats, wallaroos, wallabies, paddy melons, kangaroo rats, bandicoots, and Tasmanian devils, are a few of the members of this group, and are truly allied, in spite of their somewhat deceptive names. The native bear, for example, has no relation with real bears, which it resembles only in its thick furry skin, its habit of climbing trees, and its general appearance; even in these points it is more like a sloth than a bear. They are common in the bush, and often kept as pets when young; but they have hardly ever been brought to England, as they almost always die on the journey, partly from the difficulty of feeding them, as they will eat nothing but gum leaves. They are eaten when there is nothing better to be had, but the aromatic taste of the gum leaves is excessively strong in them; I have shot them in the trees, but they are very difficult to kill from the thickness of their skin, and even when quite dead they will frequently remain hanging to the branch by their powerful claws. Wallabies are shaped like a kangaroo, but about the size of a hare; they are frequently to be seen hanging in the Sydney markets, and are usually made into soup, which closely resembles hare soup. The animal known as the Tasmanian devil is about the size of a Skye terrier, very stoutly built, with coarse black fur, and powerful teeth; they are very savage, whence their name, and bite ferociously if brought to bay; nor am I aware that they have ever been kept alive in confinement. The creature called the Marsupial wolf, or Tasmanian tiger, is another very curious development of the order; it is the size, and somewhat the form of a wolf, but is striped like a tiger; it is carnivorous, and used to commit great devastation amongst the sheep, whence it has been so persecuted that it will probably soon be doomed to extinction; it is confined to the small island of Tasmania. The bandicoot somewhat resembles a small badger, and like it, burrows deep holes in the ground. But it would be vain to attempt to mention the varieties of habit which are to be found in the group. Perhaps the most remarkable habit of all is the one best known, viz., the mode of progression of kangaroos and their allies by hopping on their hind-legs, and I used to wonder for what purpose this mode of locomotion had been

acquired. But a friend and I were once running through the low scrubby bush, which usually covers the ground, and we observed that the easiest way of getting along was by a series of bounds over the thinly scattered bushes; in fact, we had insensibly adopted that plan without being conscious of it: and it is highly probable that what came easiest to us in a rough but scrubby country would come equally easy to the kangaroo. In open plains this gait would be unnecessary, and in dense forest impracticable; it appears, therefore, to be the natural outcome and result of the manner of growth of the Australian bush.

Australia is a great place for insects. Insects are my special study, and I ought to be glad that they are abundant, but in some cases I have regretted it extremely. The first that the stranger notices is usually the mosquito, who is mostly very blood-thirsty, and has a keen scent for strangers, whom they always prefer to old residents. These pests are at times perfectly maddening, especially in the neighbourhood of a swamp, where houses are generally regularly fortified against them, being provided with gauze coverings for all the windows and doors. There are many species, some of which bite by night and others by day. The small black ones are the worst, but there are others of immense size, of whom it is commonly said that they can stand on their hind-legs and drink out of a quart pot. I have not myself observed this, I can however testify that they can bite through a cloth coat and shirt, and that they at any rate try to bite through leather boots. I have seen them so numerous in the swamps on the Hunter River, that there was not a square inch of my coat that had not four or five on it, all feeling for a soft place; of course in such cases it is simply waste of labour to kill them. An equal source of annoyance is to be found in the fleas, who in favourable localities assemble by their bands in great hosts; where they come from appears to be a mystery, but a single house out in the bush will sometimes be suddenly invaded by an immense army of fleas, which seem to come in from the surrounding country. No amount of cleanliness will preserve a house from them in places which they seem to like, and the floor is sometimes black with them; but this is only in the country, where they are probably short of food and therefore concentrated into one spot. There is a small species of tick not uncommon in the bush, which is very troublesome when it effects a lodging; it buries itself in the skin, being at first about the size of a pin's head, but soon swelling to that of a pea if undisturbed; its presence causes a very disagreeable irritation and swelling, and a general feeling of being out of order, and if located at the back of the neck it tends to produce paralysis, and it is generally believed that it would cause death if not removed. The difficulty is to remove it; this is usually done by cutting it out with a pen-knife, but great care must be taken not to leave any part of the barbed

proboscis in the wound, otherwise it will fester and become dangerous. Dogs and cats cannot generally be kept in places where these ticks are common, as the effect of the bite upon them is paralysis and death; but I have known a dog live very comfortably in their midst, because he had learnt to run to his master and point out the place where the tick was with his hind-leg, when, of course, it was at once extracted. In the hotter districts, as one gets further North, the cockroaches begin to be a burden, being large and ravenous beyond description; in Brisbane it is generally averred that three go to the pound. A friend of mine in Brisbane, coming home late one night to his house which he had left empty, heard such a tremendous scuffling on his opening the door that he thought there were thieves in the house trying to escape, but it proved to be merely cockroaches. It is the custom in summer to sleep more or less uncovered, and in this condition the cockroaches will nibble your toe-nails, and even sometimes give a sharp bite to the toe itself, when, of course, the sleeper wakes abruptly. The spiders are particularly large and handsome, some of them very brightly coloured with red and yellow, and their bodies covered with long thorns of quaint appearance. The great hairy tarantulas are common in new houses, and often regarded with apprehension, but their bite is perfectly harmless. This is not the case with all; some produce by their bite an unpleasant irritation and swelling, whilst others are considered to be dangerous. There is a small and not uncommon species, black with a red spot on the back, the bite of which is very venomous; I have heard of cases in which it has caused the loss of a finger or even of a hand, from the local inflammation.

Amongst other orders of insects, the ants generally thrust themselves upon our notice. The bull-dog and soldier ants, which are very common about Sydney, are about an inch long, with immense jaws, and of excessive pugnacity; no sooner do they see a man in the path than they stand up on their hind-legs with their jaws wide open in a threatening manner, and if you do not retire, they forthwith advance to the attack with the greatest ferocity. I have repeatedly knocked these warriors head over heels with my stick, and on regaining their feet they always returned to the charge with undaunted courage. Should they succeed in effecting a lodgement, they lay hold with their jaws and double in their tail for the purpose of using their sting, which causes great pain and anguish. They fight together with great courage, but cannot do much harm with their jaws; their object is to use their sting, of which the effects are instantaneous. Only once did I succeed in making a bull-dog ant run away. I had found an ant of a much smaller species, but possessing a large head and very wicked-looking jaws, and being anxious to try his powers, I seized him by the body with a pair of pliers, and held him out to a large bull-dog ant who happened

to be passing. The latter immediately rose upon his hind legs and assumed a posture of defence as he saw the pliers descending, but when they were quite close he suddenly caught sight of the head and jaws of the smaller ant looking forth from between them, whereupon he immediately turned and fled incontinently; a behaviour which greatly increased my respect for the smaller ant's powers. The number of species round Sydney is extremely large, the sandy soil being suitable for their burrows. One kind is known as the jumper; it can clear fully three feet at a leap when roused. If a nest of this kind is stirred up by throwing a stone into it, the irate inhabitants can be seen leaping out actively in every direction, and it is necessary to retire with rapidity, as their bite is sharp. I have observed one slenderly built and defenceless species of ant, about half-an-inch long, which erects round the entrance of its nest a high rampart of loose sand. I believe this to be intended for defensive purposes, as marauding ants are unable to mount the rampart, the sand slipping away from under their feet. The builder of this rampart would of course be unable to go in and out of his own house, were he not peculiarly formed for the emergency; he is extremely slender, with long legs, and very agile, running like a flash of lightning; and he charges up the rampart with such uncommon celerity that he is literally at the top of it and down the other side before the grains of sand have time to fall from under him. The marauding tendencies of some species of ants must be a great trial to the insect community at large in the bush, and various methods of protection are resorted to. One of the most curious is that adopted by the caterpillars of moths belonging to the genus *Cryptophasa*; these caterpillars are considered very good eating, and are a favourite food of the blacks, who eat them either alive or roasted; white men who have eaten them inform me that the taste is much like that of nuts, but I never had the courage to make the experiment myself. These caterpillars bore a hole in the trunk of a tree, to serve as a dwelling-place only, for they do not eat the wood; the entrance they close with a curtain of silk covered over with fragments of bark and refuse; they emerge from this by night, pluck leaves from the tree and carry them in for food. The barricade or curtain which protects the entrance is no doubt intended to exclude ants, for birds could easily pluck it away, and it is no concealment; on the contrary, it generally makes the position of the caterpillar conspicuous to every eye.

My special object in Australia has been the pursuit of moths, and I know of no country in the world where the Micro-Lepidoptera are so abundant. Of these groups, the smaller moths only, I obtained 1400 species in the course of about two years collecting, of which by far the greater part are new to science and as yet undescribed. After I had been there a few months, I estimated the probable number of species of Micro-Lepidoptera

in Australia as being about 10,000, but I have now little doubt that this estimate will be considerably exceeded, so that there is a large and promising field for any naturalists who like to come out and assist me. At present I am the only entomologist engaged on these groups in Australia. It would be impossible to give any details of this immense mass of material which would be generally interesting, and I shall not therefore attempt it. The butterflies are not numerous, as compared with tropical countries generally; there are only about 200 species, not as a rule very remarkable, though there are a few splendid kinds in the northern parts of Queensland. Bees and wasps are scarce as a rule. The native bees have no sting, but bite; but there are now large nests of English bees run wild in hollow trees in the forests, containing often more than 100 lbs. of honey. In the Sydney Botanical Gardens I often see a very large wasp of a splendid deep blue colour, but never any resembling our English species. Of beetles there are plenty, but they require looking for, and as they were not my object, I have found on the whole but few.

I had a great horror of snakes when I first went out, and as I had been informed that the Australian bush swarmed with them, and that two-thirds of the kinds were venomous, it seemed that I had good reason for apprehension. Both statements I found to be literally true, but in practice I do not find that snakes are any very serious obstruction as a rule, though in likely places it is usual to wear leathern gaiters reaching above the knee, which are considered to afford complete protection. The fact is that almost all snakes are quite as anxious to avoid you as you are to avoid them, and as they are usually very vigilant, they quietly slip away when they hear you coming, so that you might seek about the bush for weeks and never see one. If you desire to see snakes, go to a likely place, stand up on a log, and remain quiet, and you will presently see them emerge to bask in the sun. I have done this and then fired at them with my revolver, when they disappeared as if by magic. The principal danger is in turning over stones or logs, when you may come upon them unawares. Again, although it is true that two-thirds of the species are poisonous, yet they are not all fatal; out of about sixty tolerably well-known species, the bite of about forty is venomous, but only five are known to produce death; the others cause disorder of the system in a greater or less degree, varying from a mere headache to a serious illness, according to their virulence, but without fatal result. The death-adder is a species especially dreaded; it is very common round Sydney, and is broad and flat, exactly the colour of the sand, and it differs from all other Australian snakes in being extremely sluggish and refusing to stir when it hears anyone approaching, when of course it bites if trodden on; but unlike other snakes, it never makes a spring, only shooting out its head with great rapidity, so

that there is no danger in approaching near it ; its bite is believed to be always fatal. The tiger-snake is considered to have the most deadly poison of all, and its bite is beyond cure ; this snake is light brown, with darker bands, and considered very ferocious ; it can spring ten or twelve feet in any direction when coiled in a ring and standing on its defence. The black snake is one of the commonest species and most easily recognised ; it is black above and red beneath, and grows to the length of six feet ; death generally results from its bite, but there are some instances of recovery known, perhaps from the bite of small specimens ; it is plentiful in swamps, and entails careful walking. The Victorian Government have posted in every village of their colony printed directions as to the distinguishing of the bite of a poisonous snake from that of a non-poisonous one, and the proper measures to be taken. One kind of snake, which is not venomous, called the carpet-snake from its markings, grows to the size of fifteen to twenty feet, and is often met with amongst rocky places, but need not be dreaded by man. In solitary houses in the bush, especially near water, snakes are a great nuisance, because they find their way into the house for warmth or food ; and you never know where you may meet them ; they are believed to be especially attracted by music, if the ladies of the house are in the habit of playing on the piano. I have myself observed the same fondness for music in lizards, of which there are a very great number, which are to be seen running over ever wall in search of flies and small insects. One of the large tree-frequenting species grows to the length of five feet, including the tail, and is considered good eating. Their quick jerky movements amongst the fallen leaves and twigs in the forest are at first very disturbing to strangers, causing false alarms of snakes at every step.

There are some splendid tree frogs, gorgeously arrayed in green and gold, and others of a uniform green colour and great size, whose croaking in the stillness of night resembles the bellow of a bull, and is really very nearly as loud ; in the country, if two or three of these establish themselves at night upon the roof of your cottage, it is necessary to slaughter them before it is possible to obtain sleep. But the noisiest creatures in the day are the cicadas, which emit a loud continuous whirring noise resembling the sound of a spinning wheel ; if you stand beneath a tree in the hot summer afternoons, when a score of these insects are at work, you might imagine yourself in the midst of a great factory with all the machinery in motion. If the ear be placed close to one in full song, the effect is almost deafening, but at a little distance the sound is not unpleasing, and you may be aware that the ancient Greeks used to keep some of a similar species in cages for the sake of their song.

To hear the sounds of the forest to best advantage, it is well to go and camp out for a few days, which the splendid climate and the dry air enable one to do without any ill-effect, though you may sleep in the open air without shelter round a fire. You will be aroused in the morning at daybreak by the peculiar mocking laugh of the great kingfisher, commonly styled by the colonists the laughing jackass, and by the bugle-like notes of the piping-crow or Australian magpie, as it is generally called. But the most interesting bird is the lyre-bird, whose magnificent erect lyre-shaped tail may be familiar to you from pictures, though it is impossible to keep the bird itself alive in captivity. It is very shy and difficult to catch sight of, but is more often heard than seen; it is an admirable mocker, and mimics every sound it is accustomed to hear with astonishing skill. There is a certain forest creek on one of the bush roads from the interior, near which lyre-birds are abundant; large droves of cattle are very frequently crossing this on their way down to Sydney overland. If you go down to this creek in the early morning when no one is stirring, you will hear the lowing of cattle, the cracking of whips, the shouts of the drovers, and the splashing of water, and yet not a living creature will be visible; the whole of the sounds are produced by the lyre-birds, who are themselves in concealment. In the breeding season a number of these birds will congregate together and select a small mound; the rest look on, whilst each male in turn dances gravely round the mound, erecting his tail, throwing his wings up and down, and screeching the whole time at the top of his voice; a regular path is worn round the mound by their united efforts.

The pleasantest camping-out trip I ever made was during my visit to the limestone caves of the Fish River, about 150 miles from Sydney. It was in the autumn, when the nights at that elevation (4000 feet) were very sharp and frosty, though by day the weather was magnificent. The train took us to within about 35 miles, and we had there to betake ourselves to horses and vehicles to finish our journey; there were about 30 of us in the party. Our track lay all the way through bush, hardly inhabited, and we disturbed continually flocks of scarlet and green parrots, or occasionally a tree-full of white cockatoos, screeching and dancing about with their wings spread out and crests erected; occasionally we started a stray wallaby or small kangaroo, which the horsemen amused themselves by chasing, but a wallaby travels like a steam-engine. It was already nightfall when we reached the brow of an almost precipitous descent of about 2000 feet, down part of which we travelled by a zigzag road, though momentarily expecting to go over the edge. About halfway down the road stopped, and we completed the journey by scrambling down in the dark by the aid of a single tallow candle, without

mishap, except that one horse fell over the edge, and would have rolled down to the bottom had he not caught in the branches of a felled tree, where he remained wedged until we cut him out with hatchets. We camped in a vast cavern fully 100 feet high, and perhaps 100 yards long; all up the sides the rock rose in broad ledges, which formed admirable sleeping places, though coated six inches thick with the dust of ages. Great fires were lighted on the floor of the cavern, and on some of the ledges, and the general effect was wonderfully picturesque. We lived in that cave four days, and spent them most pleasantly. At the mouth of the cave the Fish River creek rose out of the bowels of the earth, always flowing with a large stream, and it afforded us excellent bathing. During the day we explored the limestone caves in the range of hills, though for that matter night would have served as well as day. Each one carried a candle, and preceded by the guide, we traversed endless galleries leading always downwards, deep into the centre of the hill, sometimes dilating into vast chambers, at others contracting so that it was necessary to creep upon our stomachs, and the stoutest of the party once stuck fast and was with difficulty extricated. Some of these caves were astonishingly beautiful; the stalactites hung from the roof like immense icicles, or formed continuous thin sheets like curtains, in every shade between white and rose-colour; or they appeared as solid marble columns extending from the roof to the ground. Often the whole surface was crystallised in innumerable minute points which sparkled like diamonds, and the floor was covered with a crystallised sparkling incrustation which looked as if it were breaking out into blossom. We found many bones of the wallaby and dingo, covered with this incrustation an inch deep. In some places we saw deep holes like wells going straight down into the darkness; our guide informed us that in exploring for new caves he had once been lowered down one of these for 200 feet without reaching any bottom, when he thought it best to signal to be drawn up again. Here and there were immense chasms or precipitous cliffs, which we crossed by wire ladders secured to the rock. One of our companions in ascending a ladder some 90 feet long wanted both hands to hold on, the wire swaying about in an alarming manner; so before ascending he had stuck his candle in his hat, and when about half-way up his hat caught fire, and being afraid to let go with his hands, the expression of his countenance was extremely ludicrous, and the whole party roared with laughter. At the lowest point to which we descended, about 600 feet below the entrance, we found a river of beautifully clear water, flowing between smooth banks of the whitest crystalline marble, and disappearing in the hill. It is impossible to give any idea of the extent of the ramifications of this system of caves; the guide told us that we might travel in them for weeks without having seen

all, and that there were many difficult holes which no-one had ever explored.

Our return journey through the bush was not devoid of incident, for the vehicles kept on breaking down, and one four-horse break slipped partly through a rough bridge and precipitated its occupants either amongst the horses' legs or into the water, at one o'clock in the morning, but those accidents are expected and no one complained very deeply.

Perhaps I have now said enough to give you a fair idea of the sort of field there is for a naturalist in Australia, and I hope it may induce some of you one day to visit a country which is destined to be the greatest of the British colonies. And since papers, like sermons, should in most cases be short in order to be interesting, I will not make any further demands upon your attention.

THE DEEP SEA.

A PAPER READ BY THE REV. J. P. WAY, OCT. 28TH.

I *FEEL* some diffidence in approaching a subject so profound as the deep sea. The sea is, however, a subject which to you and to every true Englishman ought to be of great interest, for it is to the zone of seas which girdle her shores that England owes so much of her wealth, her strength, and even her enterprise and many of the most striking features of her national character. And it is on the sea that she has won so many of her greatest triumphs, and it is the sea that has nursed and reared so many of her most noble heroes, whether of peace or war; like the Athenians of old it is to the sea that England would point if asked what was the chief source of national strength; it is the sea that directly or indirectly, under the blessing of God, has made her what she is. It is, however, on the surface of ocean rather than in the depths that England has won her fame and proved her heroes; to-night it is the deep sea that we are going to investigate. We will in imagination voyage out into blue water, as the sailors say, and with the aid of the plummet line, the dredge, and the trawl, will see what we can find out about the dark and mysterious recesses which lie, it may be, miles down beneath the keel of our ship.

Most of you are perhaps aware that our knowledge of the deep sea has of late years been very largely increased by the explorations of the *Challenger*, an English man-of-war which was placed under the command of Captain Nares (now Sir George), who has since earned further distinctions in the Arctic regions. The ship was most carefully fitted out with everything that experience could suggest, and manned with a selected staff of officers, while the scientific work was conducted by Sir Wyville Thompson and five assistants.

She left Sheerness in December, 1872, and returned to Spithead in May, 1876. During this time she traversed nearly 70,000 nautical miles, taking observations at intervals, and of course directing her voyage so as not to omit any place which would be likely to yield good results. The Atlantic was crossed six times, the phenomena of the Gulf Stream being specially examined. The *Challenger* then went into the far South, nearly down to the edge of the great Antarctic ice barrier, a vast cliff of ice upwards of 200ft. high, the edge of a continent that extends over 4,000,000 square miles, and throws off icebergs into the sea that washes its base. She visited on her way some of the bleak and desolate islands—*e.g.*, Heard I., the Crozets, Kerguelen's Land, which are hardly ever trodden by the foot of man, but are only tenanted by countless

hosts of sea birds, and sea elephants. After touching at Australia and New Zealand she worked in the Pacific and between New Guinea and Japan, and obtained the deepest trustworthy sounding yet made, viz., 4475 fathoms or more than five miles. This is hard to realize; but take a spot five miles off from Marlborough: Silbury Hill for instance is about five miles distant in a straight line from the College. Imagine that distance to yourself, and then suppose the solid earth of, say, the Court to be removed for the same distance downwards as Silbury Hill is distant from us horizontally. That yawning abyss will represent the depth of ocean.

Perhaps you will wonder how it was that three and a half years were spent in this; but there was much work to be done. At each observing station, a sounding was taken to determine the exact *depth*; the *temperature* of the water at the bottom was ascertained; some of the water itself was brought up from the very bottom by a system of ingeniously constructed valves; carefully examined and analysed; and even a specimen of the very bottom itself was obtained. At some places they tied a *series* of thermometers to the sounding line and so took the temperature of the water at various depths. By aid of this they could draw out sections and represent what they would call the "thermal stratification," i.e., show how the layers of warmer or cooler water were arranged in relation to one another. This would be especially valuable in the investigation of the ocean currents. Wherever also it was practicable they would use the dredge, or the trawl, or the tow-net, and try to bring to light some of the strange forms that might be supposed to dwell in the bosom of the vasty deep. So it will be plain that the men of the Challenger had to work hard, for sounding in so many thousand fathoms is a matter of several hours' hard work.

The results of all these observations have not yet been fully worked out, as their number is so vast. However, enough has already been arrived at to give grounds for satisfaction. Indeed, as one of the chief naturalists expressed it, "We may hope that the key to the interpretation of much of the past history of our globe, is at present lying at the bottom of the sea, waiting only to be brought up."

Most of you are probably aware that there is much more sea than land on the face of our globe. In fact if the total area of the globe were divided into fifteen parts of equal size, the land would only occupy four and the sea the remaining eleven. But besides this the average height of that part of the earth which is above the sea level is not more than 1000 feet. Our old friend Martensell, for instance, is a hill of only about the average height. On the other hand the average depth of Ocean is $2\frac{1}{2}$ miles or 13,000 feet. So there is a sum for the mathematicians. If you work it out you will find that the total volume of the sea water is about 36 times that of the land above sea level.

Another ingenious person has calculated that if all the land above the sea were shot in one mighty avalanche into the depths of ocean, and more still dug away till the surface of land and surface of the sea bed were level, even then, though the waters would cover the whole globe, their average depth would only be reduced by about 800 fathoms, and would still be about 1400 fathoms deep over all the earth. So great Neptune's ocean has some claim to our consideration and respect. And yet, as compared with the bulk of the globe itself, it has been estimated that a film of water laid on a sixteen-inch globe with a camel's hair brush would about represent the depth of sea as compared with the thickness of the earth. What grain could we find small enough to represent one of the minute individuals that walk this earth under the name of man.

Of course these calculations are necessarily somewhat vague, but they are exact enough and reliable enough to give us some sound idea of the facts of the case.

But now it is time for us to be making our descent into the depths themselves. We will start in the Tropics, and we will dive in imagination into the liquid crystal of the Indian Ocean. As Professor Schleiden says: "it opens to us the most wondrous enchantments of the fairy tales of childhood. The colouring surpasses everything: vivid green alternates with brown or yellow, rich tints of purple from pale red brown to shades of deepest blue. Brilliant rosy, yellow, or peach-coloured Nullipores overgrow the decaying masses and are themselves interwoven with the pearl-coloured plates of the Retipores, resembling the most delicate ivory carvings. Close by wave the yellow and lilac fans of the Gorgonias, perforated like trellis work. Around the blossoms of the coral shrubs, play the humming birds of the ocean, little fish sparkling with red or blue metallic glitter, or gleaming in golden green. or in the brightest silvery lustre: while softly, like spirits of the deep, the delicate milk-white or bluish bells of the jelly-fishes float through the charmed world. When day declines and the shades of night lay hold upon the deep this fantastic garden is lighted up in new splendour. Millions of gleaming sparks, little microscopic Medusas and Crustaceans, dance like glow-worms through the gloom. The sea-feather, which by daylight is vermilion coloured, waves in a greenish phosphorescent light. Parts which by day were perhaps dull and brown, and retreated from the sight amid the universal brilliancy of colour, are now radiant in the most wonderful play of green, yellow, and red light, and to complete the wonders of the enchanted night, the silver disc, six feet across, of the moonfish moves faintly luminous among the crowd of little sparkling stars."

Thus does the eloquent Professor describe the gorgeous bowers that encircle the coral strands of the Indian seas. It is worthy of notice, before

we pass on, that this scene of beauty owes its splendour almost exclusively to animal and not to vegetable life.

But deeper still must we go. These splendours are those that fringe what after all are but the shores of ocean. Our aim just now is to investigate the secrets of the deep sea. First of all let us examine the shape of the ocean basin itself. Before the voyage of the Challenger little had been learned with certainty except in the case of the N. Atlantic. This was carefully sounded before the telegraph cables were laid connecting England with America, and it was then discovered that for about 100 miles W. of Ireland the bottom sinks very gradually, but that then we reach the real brink of the ocean bed, and it falls so rapidly that we quickly descend from 100 fathoms to 1200 or 1500. The bottom falls still further to more than 2000 fathoms, and then, with the exception of a ridge in the middle, becomes "a slightly undulating plain of immense extent." On the American side, just as outside our own coast line, this plain is bounded by a steep ascent leading up to a shallower area of 100 fathoms, and then to the coast line of America.

A like condition has been found to exist, in the North Pacific and in the other great oceans, and the Challenger surveyors expressed special surprise at the extraordinary flatness which the bed of the oceanic area displayed all over the world. After sounding one day the Challenger might sail 100 miles or more in the night, and the next day find very much the same soundings as before. In fact it has been said that if the bed were laid dry, a spectator standing in the middle of it would see extending on all sides of him a plain only to be compared to that of the prairie of North America or the pampas of the Southern Continent. And as to the term ocean basin, the shape thereof really resembles that of a flat tea-tray or waiter, with its steeply sloping rim.

With regard to the seas immediately around our own shores, they are so shallow compared with the ocean to which they are adjacent, that it would seem that Great Britain with all her islands is really only a part of the great continental platform of Europe. And an elevation of 100 fathoms (little more than the height that Martensell rises above Marlborough) would turn out the sea, make the channels dry and bring our isles into union with France, Germany, and even Norway, were it not for a narrow deep channel that lies just outside the fiords of the latter. We can, however, dispense with this extra elevation, for though the words of the old song testify to a belief that England once "uprose from out the azure main," yet were she and the beds of her girdling seas to rise still higher, she would lose the many advantages which "the right little, tight little island" possesses at present.

It has been further concluded from the Challenger observations that the islands which are found in the true basin of the oceans are all of volcanic origin

thrown up from beneath and not remains of land sunk down from above. Among these of course are not included those which, like the British isles, are as we said only an outlying part of the neighbouring continent; the corner of which is slightly sunk below the level of the rest; or those which like the large islands of the Malayan Archipelago are supposed to be the "remains" of a submerged continent.

But one of the most interesting results of the Challenger expedition has been the increased knowledge which we have obtained of the deposits of oceans. They give a clue to the past history of the world. The ordinary deposits which are formed from the breaking up of the constituents of the land were, generally speaking, only to be found in the neighbourhood of the land, i.e., in the comparatively shallow waters. Almost the only exceptions were to be found when the sounding was taken within reach of the outflow of a large river, or when the Challenger's course lay parallel to the West Coast of Africa. Here 200 or 300 miles off the coast they found on sounding some of the ordinary siliceous sand of our shores. This had been blown off the great Sahara, and even as they passed, was in the act of being deposited, as was shewn by the amount that accumulated on the ship's deck.

Although, then, in many places on the land and even in the chalk of which our own Wiltshire downs is composed, we find remains which point to the fact that the place where they are found was once covered by sea; yet the Challenger authorities say that they can discover little or no evidence to show that any part of the *real* oceanic area was ever other than it is now. Otherwise they would have found here and there remains of alluvium or detritus which would betray the connection with the land. What then do we find at the bottom? Do we expect to see there like Clarence in his dream?

"A thousand fearful wrecks,

A thousand men, that fishes gnawed upon.

Wedges of gold, great anchors, heaps of pearl,

Inestimable stones, unvalued jewels

All scattered in the bottom of the sea."

They may be there for all we know, but for the present they are out of our reach and ken, and will remain so unless some veritable Captain Nemo shall arise, start a limited liability submarine boat Co., and equip an exploring expedition which shall travel at least 20,000 leagues under the sea to plunder the rich galleons that lie scattered about the deep.

At present all we can do in the vast depth of water that covers the floor of mid-ocean is to bring up, in little pieces varying from a few oz. to 11b., samples of the clay, the mud, the ooze or whatever it is that lies at the bottom. Even these, however, when carefully analyzed, can an interesting tale unfold.

The deposit most frequently found is the red clay. This puzzled the scientists of the Challenger for some time. It seemed at first sight to be the deposit of some continental river. And there was a nice problem to be solved! how did it get there, so many thousand miles from land? Fortunately for science they had let a tow-net down, and, floating a little way above the lower strata of the water, they captured some pieces of pumice stone.

On looking at the clay they found small pieces of disintegrating pumice embedded here and there in this: and it then occurred to them that, as the pumice stones contain a large proportion of feldspar which supplies the material of clay, the clay was produced from them. It therefore had a volcanic origin, for pumice stone is only common lava, raised into a spongy condition by the liberation of gases within it. It is the froth from the top of the volcanic caldron. It was a shower of minute pieces of pumice stone that buried Pompeii, and it is probable that the pumice found so far out at sea had its origin in land volcanoes. Pumice will float some time before it becomes waterlogged. It must however have taken ages of desultory eruptions to supply enough pumice to make an appreciable deposit over hundreds of thousands of square miles. It is a proof of the undisturbed quiet that reigns below, and permits of the accumulation.

In some regions again the bottom seemed covered with a deposit of manganese, one of the heavy metals. It was most commonly found in the shape of balls of various sizes, inside which would be found an organic nucleus such as a Shark's tooth or Whale's ear bone, or even a bit of pumice or sponge.

This deposit like the last, is supposed to be extremely slow, and the manganese thus formed differs in structure from any of the known ores of this metal. Dr. Carpenter asserts that the investigation of the formation of these nodules is likely to throw great light on the production of many minerals which as yet is not understood. Let us hope it will lead to some discovery as interesting and perhaps more useful than the late discovery of a method of producing the diamond.

This manganese as well as the red clay, seems to have a volcanic origin, being present in decomposing pumice and in volcanic ashes.

There is yet another deposit which must not be passed over, and this is more extraordinary even than the last. You have doubtless often seen a falling star burst in the sky. What becomes of the fragments? The large pieces we find, but the minute dust is lost in the sediment of other sorts that form the surface of the earth. But when this meteoric dust falls into the deep abysses of the ocean, it is brought up again from there to tell its story. But hear Prof. Geikie, the great geologist on the subject. He says that in the midst of the red clay were found "numerous minute spherical

granules of native iron, which as Mr. Murray (the discoverer) suggests, are almost certainly of meteoric origin—fragments of those falling stars which coming to us from planetary space, burst into fragments when they rush into the denser layers of our atmosphere. In tracts where the growth of silt upon the sea floor is excessively tardy, the fine particles scattered by dissipation of those meteorites may remain in appreciable quantity. It is not needful to suppose that meteorites have (burst and) disappeared over those ocean-depths more numerous than over other parts of the earth's surface. The iron granules have no doubt been as plentifully showered down elsewhere, though they cannot be so readily detected in accumulating sediment."

He goes on to say that "He knows no recent discovery in physical geography more calculated to impress deeply the imagination than the testimony of this meteoric iron from the most distant abysses of the ocean. To be told that mud gathers on the floor of these abysses at an extremely slow rate, conveys but a vague notion of the tardiness of the process. But to learn that it gathers so slowly that the very star dust which falls from outer space forms an appreciable part of it, brings home to us, as hardly anything else could do, the idea of undisturbed and excessively slow accumulation." This is difficult to accept, but names like Geikie, Murray, and Carpenter carry weight.

But besides the inorganic deposits of red *volcanic clay*, *manganese*, and *meteoric dust*, there are some organic deposits which cover large tracts of the deep sea bottom. These consist of *calcareous* organisms, or organisms whose shell plates are formed of carbonate of lime; or else of *siliceous* organisms whose skeletons or shields are composed of pure siliceous or flint.

The first class of this deposit consisted of *Globigerina* ooze, or ooze composed chiefly of the minute shells of the family of *Globigerinidae*; an appalling name you will say—but it has been applied to them because of the globular shape of their shells, of which three or four or more are generally grouped together. They belong to the larger family of *Foraminifera*, so-called because of the small apertures or perforations in their shells. These shells are exceedingly minute, and are filled with nothing but a drop of gelatinous matter called "Sarcodæ," and when they are undisturbed this substance exudes, as it were, through the numberless little holes in the outer shell, till the whole shell is covered all over with an array of delicate filmy points two or three times as long as the diameter of the shell. They are most beautiful objects when alive and viewed through a microscope. Though so exceedingly minute that the ooze consisting of these shells feels like grease to the touch, and though their organisation is very lowly, yet they are a class of most interesting creatures. For instance one member of a similar family

is so deficient in organs that it has no mouth, no eyes, no stomach, no legs, no anything. It is but an exceedingly minute drop of something half solid, half transparent, which can do little more than move. For this purpose if it wants a leg it makes one, *i.e.*, it pushes forward one corner of the thing which is itself, and the rest trickles after it. If you cut it in half, it joins itself again, and is no more hurt by the process than the Scandinavian heroes in the halls of Odin, who might be hewn in half in the morning's encounter but were quite ready again for the evening's feast.

The shells of the foraminifera are often found in a fossil state. Whole hills are formed of them, and innumerable dwellings for mankind are built out of the remains of these seemingly insignificant animalcules. As for us who dwell in the midst of a chalk formation, at every step we take round Marlborough, we walk upon countless millions of these little creatures, and tread on ground which was once the bottom of the deep, buried beneath fathoms upon fathoms of blue water.

If you take a piece of the chalk and wash it in water carefully and examine the sediment through a powerful microscope, you will find countless specimens of these shells.

The other organic deposit found by the "Challenger" was a class of siliceous organisms belonging to the group of Diatomaceae, so called because they increase by dividing themselves. Their shell cases are formed of hard flint, so hard that though the Diatoms themselves perish, yet their shells resist decomposition better than almost any other product of organised nature. They even resist the action of fire, and are found in the ashes thrown up from the depths of volcanoes. They are found in fresh as well as salt water, and though like the Foraminifera they are minute, and hold a low place in the scale of nature, yet they have produced great geological changes, and have left traces on the face of the earth that will last as long as the world lasts. Tripoli stone is composed of thin siliceous shells, and that is why it is so good for polishing other substances. To give some idea of their numbers, we may add that in a thick layer of the deposit occurring in Bohemia it has been calculated that 42,000,000,000 exist in every cubic inch of the stone.

Both of these last two kinds are found in the surface water above the bottom where the deposit lies, and it has been conjectured that some of them pass all or part of their lives near the surface, and then sink to the bottom, and dying form the ooze which covers so much of the Oceanic bed.

When the Atlantic telegraph cable was first about to be laid many fears was expressed as to the dangers which it would undergo from fierce currents or possibly even the downward force exerted by the great Atlantic surges. But these shells though so small and so delicate are not even scratched,

much less crushed or broken, and we are compelled to believe that the bottom of the deep sea is a scene of perfect repose and never broken calm : over which the darkness of blackest night ever reigns and whose recesses, like the valley of Avilion, are never troubled by storm or tempest. The sea "like the sun cloud with its flakes in a calm," is ever letting float down upon its bed, ceaseless showers of these microscopic shells. And we may imagine with Captain Maury that, whatever "sunless wrecks" may "strew its bottom, are in course of ages veiled beneath this fleecy covering, and present the rounded appearance which is seen over the body of the traveller who has perished in the snow storm."

There is an irregular kind of deposit which occurs here and there but which is hardly to be classed among the oceanic deposits because it does not occur far from the line of the continental platforms. That is the deposit made by ice-fields and ice-bergs, which in the course of their decay let fall to the bottom a great amount of material. Of course this would be found in the extreme N. and S. parts of the great ocean basins.

All these deposits which we have mentioned, the red clay, the manganese nodules, the meteoric iron, and the organic ooze are as different as can be from any sands or clays that are washed off the land. These we only find in the shallower waters bordering the land itself, and not the least trace of any such sediment has been found at a distance from the continental platforms, *i.e.*, anywhere in the depths of the true oceanic area, unless we except the vicinity of rivers like the Amazon whose stream runs a long way out from land. The investigation of the deposits of the deep sea, has thus confirmed the conclusion to which perhaps the existing configuration of the earth's surface would lead us as to "the *general persistence* of those original inequalities which have respectively served as the bases of the existing continents and the floors of the great ocean basins."

As Prof. Geikie says, "from the earliest and geological times, the great area of deposit, *i.e.*, sedimentary deposit, has been, as it still is, the marginal belt of sea-floor skirting the land." And that "the present land of the globe, though composed in great measure of marine formations has never lain under the deep sea. Even its thick marine limestones are probably the deposits of comparatively shallow water."

There is one other fact that ought to be mentioned and that is that the lower stratum of the water of the deep oceanic basins is within a few degrees of the same temperature all over the world, *i.e.*, a degree or two above or a degree or two below freezing point (it is a noteworthy fact that at the bottom of the deep sea is sometimes found water below the freezing point of fresh water). It was once thought that this was an overflow of the Polar current, but the truth is that only the upper part of the ocean is at all affected by the

sun's heat ; this is but a small portion of the whole depth. The rest remains always at this low temperature, and the result is that the Fauna of the deep sea, viz., that which is found below 400 or 500 fathoms, is more or less the same all over the world, and consists chiefly of sponges, echinoderms and crustacea ; corals and mollusca are scarce. In the same way we find that the flora that grow on the higher parts of lofty mountains to a great extent resemble each other all over the globe.

But you will want to hear something about these deep sea fauna and the sort of creatures which live down below. The naturalists of the Challenger were rather disappointed in their hauls. They expected to find many more kinds which were quite new, and even hoped to find some kinds which were only previously known as fossils, and, as Mr. Moseley says, though they had been so often disappointed, yet even to the last every outtle fish that came up in the deep sea net was eagerly squeezed to see if it had a Belemnite's bone in its back. Most of the deep sea forms of life which they did get were of a kind which would be more full of interest to advanced naturalists than to us for our present purpose.

Many of the animals inhabiting the depths of the sea are blind like cave animals such as the Proteus, and are provided with long and delicate feelers to feel about with, like a blind man with his stick. Others have their eyes enormously enlarged to make use of what little light there may be in the depths. This light can only be that emitted by phosphorescent animals. For no ray of the sun can penetrate, it is supposed, further than 200 fathoms. The deep sea trawl brought up a very large and interesting specimen of one of these light-emitting animals. It was called a Pyrosoma or "Firebody." This object was shaped like a sack, 4 ft. long and 10 ins. in diameter, cased in walls of jelly an inch in thickness ; these walls were spotted all over with pink lumps, each being a separate animal. In this case there were 100,000 or 200,000 of them. At night time it was put into a great tub of water and on being touched exhibited a brilliant phosphorescence. The great men of science amused themselves by writing their names on its body with their fingers, and in a few seconds, out came the name, inscribed on the Pyrosoma's body in letters of fire. In the cause of science they then carefully administered a course of electric shocks. At first it did not seem affected, but the next morning they found that the goodly company of the 200,000 had dissolved partnership. In other words the great Pyrosoma had fallen to pieces.

In the course of their dredging they found many fine specimens of the Euplectella or Venus' flower basket, whose habitat was for a long time supposed to be confined to the sea around the Philippine Islands, because that was the only place where it had been dredged for. The Challenger,

however, found it in many places. It is a species of sponge, though not much like what we commonly call sponges; It is shaped something like a cornucopia, and is composed of glistening threads of pearly white which look like spun glass but really are siliceous. These cross and recross each other just as if woven by the hand of a cunning artificer. But no! it is not the work of mortal hands, nor is it a work of wonder woven by some busy mermaiden in the cool grotts of ocean. It is one of nature's own productions, and there are other glass-like structures of similar nature, found in the sea, such as the Hyalonema, or glass rope sponge. As to ordinary fish, they frequent the shallower waters. Here they have light, and therefore have more food, and the pressure is not so tremendous as in the deep sea.

The great depth and the consequent pressure gave rise to many difficulties in sounding and dredging operations. When the heavy sounding weight, a mass of metal as heavy as a common hall, is dropped overboard, it takes an hour-and-a-quarter to reach the bottom in 4,500f. But easy is the descent to Avernus. To bring the line up again to the upper air, *Hic labor, hoc opus est*. It occupied a donkey-engine three or four hours to wind it in again, especially when there was a dredge attached. A set of immensely strong india rubber accumulators was used to ease the strain, but even with these the rope occasionally broke, and with it went three or four miles of line. In order to lessen the labours of recovering the sounding line, they used an ingenious device. The heavy weight had a hole bored throughout its length. Through this was inserted a rod with a cavity at the lower end, which stuck in the ooze at the bottom and imbibed a section of it. The weight was hung on a notch at the top of the rod by a loop of wire, which kept down a spring. Directly the apparatus touched the bottom the weight of the iron sinker was taken off the spring, which forced off the fastening and released the sinker, leaving only the rod to be drawn up.

The pressure at the bottom of the deep sea is almost past comprehension. A wooden trawl beam came up with the very knots forced out in many places, and the whole piece of wood was so permeated with water throughout its thickness that it would not float. An experiment made on board the "Challenger" will shew the immense pressure that exists only 2000 fath. below the surface (i.e., less than half of 4500). Mr. Buchanan strongly sealed up a glass tube at both ends. It was made of thick glass. This he wrapped in flannel and placed in a tubular case of copper (one of those used to protect the deep sea thermometers). The case was closed, but had holes left in it. They sent down the case and tube to the depth of 2000f., and drew it up again. They then found that the copper wall of the case was bulged in opposite the glass tube, and the glass tube itself, though of thick glass, and though very strong, owing to its cylindrical form, was found inside the

flannel reduced by the pressure of the water—a fluid, remember—to a fine white powder, something like snow. The fact was the tube in going down had held its own for a long time, as the depth and pressure increased, but had at last yielded suddenly. They called it an *implosion*, being the reverse of an explosion. The copper case would not have been bulged at all had not the glass given way so suddenly that the water had not time to get in through the holes. If it had, the fact that fluids exert an equal pressure in every direction would have preserved it intact, as the pressure within would have balanced that without. This is the reason why it is possible for the delicate organisms which exist at the bottom of the sea to stand a pressure which at 4475 fathoms is upwards of 4 tons to the square inch. I may add that the pressure of the atmosphere on our bodies is only 15lbs. to the square inch. This amounts in a man of average size to about 14 tons on the whole body; while at the bottom of 4000 fathoms it would be more than 8000 tons on a surface as large as a man's body.

Owing to the brief time at our disposal we have been able to take but a cursory view of a great subject, but I hope it is one which some here may have time and the desire to take up and study for themselves. They will find abundance of interesting information put in an entertaining form in such books as—*The Naturalist on the Challenger*, by Moseley; *Log letters of the Challenger*, by Lt. G. Campbell; *Wyvills Thomson's Books*; *Maury's Physical Geography of the Sea*, and the *Papers* by Dr. Carpenter, and others, which have appeared in various periodicals. There are several to be found on various branches of the subject in "*Nature*," "*Popular Science Review*," and others.

In conclusion, let us hope that although the bed of ocean be shrouded in the gloom of perpetual darkness, which the eye of man may never penetrate, yet that with the aid of the plummet and the dredge, we may yet see the mysterious key brought up which is to open the door to the interpretation of some of the greatest secrets of the world's past history.

WIND AND WEATHER.

READ BY THE REV. G. C. BELL NOV. 25TH, 1880.

THE originating cause of all winds and changes of the weather is the sun without his heat the air would stagnate all over the world.

Over the ocean the heated region on either side of the Equator sends up a vast mass of warm air; from N. and S. air streams in to fill up the gap caused by its rise, but as the earth rotates on its axis from west to east, the parts near the Equator revolve with greater speed than those nearer the poles; accordingly these currents coming from N. and S. blow over the earth as N.E. winds in the Northern hemisphere and S.E. in the Southern hemisphere. These are the Trade winds.

About 30° N. and S. of the Equator the mass of air that was driven up by the Equatorial heat sinks to the level of the earth. Part of it then returns to the equator, part streams towards the poles; but long before it reaches our latitudes its equatorial velocity has been spent.

In our latitudes the motion of the air, *i.e.*, the wind, is mainly due to changes in the pressure of the atmosphere. A Dutch Professor, Buys Ballot of Amsterdam, has expressed this connection by the law, "*If you stand with your back to the wind the Barometer is higher on your right hand than on your left,*" which is the very corner-stone of weather knowledge. I shall return to it shortly. But first it is necessary to understand what is meant by a low and a high barometer. In the ordinary barometer we have a tube in which a column of mercury varying from about 27 to 31 in. in height is balanced by the weight of the atmosphere, which presses on the mercury in a reservoir at the bottom of the tube: the upper part of the tube being as perfect a vacuum as can be made. The excessive weight of mercury enables this small column to act as a counterpoise to the weight of the air, which is in the mean about 15 lbs. on every square inch, and the compactness of the instrument is a great convenience for ordinary use. But the objection to it is that large alterations in atmospheric pressure produce comparatively small changes in the column of mercury, and very minute changes are difficult to observe, even by experienced observers. It is like weighing feathers with leaden weights.

Now whenever I refer this evening to barometrical readings, remember that this is the instrument which is supposed to be used. There are two other kinds in common use. One is the ordinary wheel barometer in which the rise and fall of a metal float resting on the mercury is employed to move a hand over a dial plate; this, however, from its construction, is far from accurate, and the instrument is really little better than a scientific toy.

Far more useful is the aneroid, consisting of a metal box, whose lid is capable of being pressed in by the weight of the atmosphere, and expanding again as that pressure becomes lighter. By means of a series of levers, delicately adjusted, the movements of the lid are made to move a hand over a properly graduated dial, so that a very small movement of the lid can be made distinctly visible. Yet, sensitive as this instrument is, so that I can even measure with it the height of my study by carrying it upstairs, it is far from being as accurate as the mercurial barometer for weighing the atmospheric pressure. The most accurate and sensitive of all barometers is one recently described in the *Times*. In this instrument mercury is replaced by glycerine, which is so much lighter that a column of 30in. of mercury corresponds to a column of glycerine nearly 27ft. high, or more exactly 322½in., so that a change of the air that would make the mercurial barometer rise one-tenth of an inch drives the glycerine up more than an inch. The rise and fall are thus made startlingly visible.

One of these barometers has recently been fixed in the *Times* Office, and you have seen lately a graphic representation in each day's *Times* of the rise and fall of the glycerine on the actual scale.

You may perhaps ask why glycerine is adopted. Why not water, which is lighter than glycerine, and would therefore shew the changes still more plainly? the answer is that at ordinary temperatures water readily gives off vapour, which rising into the upper part of the tube partially destroys the vacuum on which the accuracy of the instrument depends.

But the size and consequent expense of the glycerine barometer, make it unsuitable for general use, and therefore we take the mercurial barometer as our standard of reference.

Returning now to Buys Ballot's law you will probably feel that it needs further explanation and illustration. If you look at any weather chart you will see lines passing through different places, the lines often parallel (or nearly so) to one another, and generally some with their extremities meeting, so as to form circles or ovals. Each of these lines passes through those places at which the mercury in the barometer stands at the same height (or, in other words, where the barometric pressure is equal), and we can see at a glance on the chart that the surface of the atmosphere has dipped down into the form of a conical hollow, the deepest part of this hollow being where the circular lines are smallest, and the sides sloping out in all directions from that spot. You will also notice that the wind (the direction and force of which are indicated by arrows) also goes in circles from right to left round the centre of the depression, and consequently, if you stand with your back to the wind, the depression will be on your left hand, and the sides of the cone rise higher and higher on your right, i.e., the pressure of the atmosphere

will be greater on your right hand than on your left, or in the terms of Buys Ballot's law: "the barometer will be higher on your right hand than on your left."

Now when masses of air of different pressures are near each other, there is instantly a cause of motion; the heavy air rushes towards the region where there is lighter air, or where the barometric pressure is less; and the greater the *difference* of pressure over a given distance the more violent and rapid will be the motion caused by the effort to restore the balance. A convenient way of measuring and comparing difference of pressure over a given district is by what are called 'Gradients.' This is a term used on railroads; for instance, I believe that our new Marlborough and Swindon railroad rises from the plain to the downs by a long gradient of 1 in 75, *i.e.*, one foot vertical in every 75 horizontal. Meteorologists construct a scale of gradients. Similarly the horizontal unit is now 15 nautical miles, so that if between two places, A. and B., there is a distance of 15 nautical miles, and also a difference of '03 inch in the height of the mercury, we say there is a gradient of '03. The greater the gradient the more chance of a violent wind, and *vice versa*; consequently if the gradients over a large region are small, settled weather is almost certain, and it is said that "No serious storm is ever felt over the United Kingdom, unless between some two stations there is a difference of at least half-an-inch of mercury." On Feb. 1st, 1868, there was a difference of $1\frac{1}{2}$ inches between Rochefort and Aberdeen, 673 miles apart, equivalent to a gradient of nearly 4, and 17 stations reported severe gales.

Accordingly changes of weather depend *not*, as is often supposed, on the *absolute height* of the barometer anywhere, but on the relative height at different places, and when the barometer is very low, all we can say is that there is more chance of wind and bad weather, since it is probable that in some adjacent district there is higher pressure.

But gradients do more than shew whether there is a chance of wind; they also enable us to forecast what kind of wind. From the centre of lowest pressure draw lines radiating; suppose yourself standing on one of these lines, with this centre on your left hand. Buys Ballot's law shews that the wind will probably blow from behind you.

Thus supposing on the

N. of the centre of pressure, the wind were E. the pressure would

be higher in the N. than S.

W.	"	"	"	N.	"	"	W.	"	E.
S.	"	"	"	W.	"	"	S.	"	N.
E.	"	"	"	S.	/	"	E.	"	W.

We have then winds circulating round the centre of lowest pressure in a direction *opposite* to the hands of a watch or the sun's motion. This circular rotating system of winds is called a cyclone, a name which used to be confined to the more violent specimens of West Indian storms, but is now commonly applied to all such systems, rotating in the Northern hemisphere from right to left.

Why do the winds circulate? I said before the air tends to move towards the region of lowest pressure; why does it move at right angles to the radiating lines instead of along them? Why does it circulate like a wheel instead of rushing along the spokes of the wheel? Supposing I have a basin with a plug at the bottom and full of water, if I remove the plug, the water will run out, rushing towards the hole in straight lines; but if I give even a very small horizontal movement with my hand, a rotatory movement will be at once set up, and this movement will increase as the water runs out. The impulse that I give then with my hand, is given to the air by the earth's rotation, which causes every current to deviate to its right in the Northern Hemisphere, and to its left in the Southern.

These then are the characteristics of a cyclone:— Barometer lowest in centre, and strong winds circulating from right to left, bringing with them much moisture, cloud and heavy rain.

The opposite conditions accompany what is called an anticyclone; when the central area is one of high barometric pressure, the air circulates slowly, and there are light winds rotating from left to right, *i.e.*, with the sun or the hands of a watch. The air is dry, consequently there are few clouds and little rain, though fogs are frequent.

The next point to be noticed is that both these systems, but more especially the cyclones, move, often with great rapidity, over very large areas of the earth's surface. We are familiar with the storm warnings sent from America. The Americans have a magnificent system of stations, maintained by the Government over the length and breadth of the United States, and as the movement of storms in N. latitudes is usually from West to East, the stations on the E. coast facing England have very full and ready information of the weather that is coming to them from the W. Moreover they get information from ships that arrive from Europe respecting storms they have met on their way.

A considerable percentage, at least 40 in every 100 of these predicted storms actually find their way to us, having travelled over the ocean at a speed of from 10 to even 70 miles an hour. Let me say in passing that the rate of motion of a storm has no connection with the force of the wind in the storm itself; for instance, West Indian hurricanes travel slowly but their winds are terrible, and on the other hand a storm that passed over England

in March, 1876, at the rate of 70 miles an hour was not accompanied by very violent winds.

Now what is the cause of this motion of the cyclone as a whole?

Here we come into a very uncertain region. The latest theory is that the centre of a cyclone is a great spiral eddy or vortex of ascending air (sometimes with an inner circle of calm on the surface of the earth); and that the inrush of air which finds issue in this eddy is due to the condensation of the water vapour suspended in the air over a large area, where condensation produces a diminution of pressure, as in a bladder full of steam.

But the currents that come from the S. are most liable to this condensation as they pass from warm to colder regions, where the air cannot hold so much vapour suspended. And you have seen that the S. winds are on the E. side of a cyclone. It is therefore on this side that condensation occurs most rapidly, and so the eddy or vortex propagates or reproduces itself on its E. side, i.e., from W. to E.

Our weather is of course not entirely due to cyclones or anticyclones. But as a matter of fact out of every 100 daily weather charts it will be found that about 68 will shew winds more or less connected with one or the other. And a peculiar feature is that cyclones tend to follow each other in strings or series, as though the disturbing force had not spent itself by the discharge of one storm, and hence for weeks together we may have a period of disturbance with all the varieties of wind that belong to the different sections of the cyclones that pass over us. But from our geographical position the centres of cyclones seldom pass directly over our coasts, but to the north of us, and so we have a large share of the S. and S.W. winds which belong to the right-hand half of the storms.

Sometimes two or more systems are in action near one another, and in the regions between them there will be large strips or bands of high or low pressure as in the weather chart of to-day's "Times." Another marked feature is that the storms often follow the lines of coasts or mountains, partly because the sea more readily supplies the vapour on which their action largely depends, partly because the irregularities of the land break up and check the rotatory currents of wind. Thus you will find that in particular neighbourhoods in England thunder-storms are said to be more or less common than in others.

If you have ever watched a great cyclonic thunder-storm you may have noticed that the heaviest rains often fall after the barometer has begun to rise, and when, therefore, the centre or core of the depression has passed over you. This is explained by the curious fact that the axis of eddy is often not vertical but inclined, so that some thousands of feet over your head the

winds will be opposite to those blowing on the surface, and this intermixture of warmer and colder currents naturally produces heavy rain.

The subject is a very large and complex one and I am afraid it must be tiresome to some, but I should like to say a word about weather signs. They have naturally in all ages been of immense interest, especially to farmers, and some of you know the amusing mass of odd tokens of good and bad weather that Virgil has collected from older sources in the first Georgic. He mentions several tokens drawn from the look of the Moon. But he has the wisdom to avoid a very popular superstition of our own day, that the changes of the Moon affect the weather. Many of the old-fashioned Almanacks help to keep up this baseless fiction. But you will find in the all-pervading Whitaker the true statement "that an examination of the Greenwich observations for more than half a century proved the complete fallacy of this theory." All that can be allowed according to Sir J. Herschell is that the Moon at its full appears to have a *slight* effect in diminishing the amount of cloud.

A description was then given of the automatic machinery used at Oxford for registering the movements of the barometer and the wind-gauge, illustrated by an ingenious model constructed by H. L. Callendar.

BOTANICAL REPORT FOR 1880.

THE past year has been a very unfavourable one for Botany, and a general remark has been the small amount of flowers visible at any one time. This has told very remarkably on the numbers observed on field-days: in fact only once could we get as many as 200 on one afternoon, and then only by extraordinary exertions. Notwithstanding this, the number of notices is large, and very few plants have escaped observation; and the work of the School must be considered as decidedly good. In the early part of January and February no plants (except very casual ones) were observed; during the three other quarters of February the numbers were 9, 11, 19. By the end of March there were 52 plants in flower; by the end of April, 106; of May, 210; of June, 264; and by the middle of July, as many as 292; after this the number fell off rapidly, only 261 being in flower at the end of the month, and by the middle of September 249. Plants lasted well till the cold of October, when the numbers in the four quarters were 237, 214, 178, and (after the very severe frosts) only 121. For many of these latter notices we are, as usual, indebted to the Rev. J. SOWERBY. In November the numbers fell off still more rapidly, only 42 being in flower by the 30th; but the mild December enabled plants to hang on, as it were, no less than 31 being found by the 18th by E. B. Badcock and R. W. Rickards, and on the 6th December a specimen of the Sloe (*Prunus spinosa*) were found in flower by Dr. Fergus.

The dates of *proper* first flowering are only entered in the table (except in any special instances). In some cases stragglers appeared for some time before the plants could be properly said to come into flower; these "casuals" have been omitted. In many instances, also, *several* boys brought in a "first notice" of the same plants. Only one has had his name entered in the table. The number of contributors has been very great, and though a few may be more especially noted as *real* workers, yet the number of both classes is greater than in ordinary years.

Two plants have been added to our List, both discovered by A. E. Aldworth; they are a species of Fumitory (*Fumaria confusa*), and a Wood Rush (*Luzula sylvatica*). The former is rather a weed of cultivation, and may fairly have escaped detection before, but it is curious that the latter was only found for the first time on the expedition taken to Chisbury Camp on June 12th.

Names of those whose Initials occur in the following List :—

J.W.A.	...	...	J. W. Adamson
A.E.A.	...	...	A. E. Aldworth
F.S.A.	...	...	F. S. Alston
W.J.V.B.	...	...	Rev. W. J. V. Baker
M.A.B.	...	...	Rev. M. A. Bayfield
P.S.B.	...	...	P. S. Bent
J.M.B.	...	...	J. M. Beresford
H.B.B.	...	...	H. B. Bird
C.E.B.	...	...	C. E. Bliss
C.M.B.	...	...	C. M. Bull, Esq
P.H.C.	...	...	P. H. Cannon
E.K.C.	...	...	E. K. Chambers
H.J.C.	...	...	H. J. Cooper
C.E.C.	...	...	C. E. Cooper
G.W.D.L.	...	...	Rev. G. W. DeLisle
O.E.	...	...	O. Elton
R.E.F.	...	...	R. E. Few
E.P.J.F.M.F.	...	...	— Filgate
H.C.B.F.	...	...	H. C. B. Foyster
E.N.G.	...	...	E. N. Gardiner
H.G.G.	...	...	H. G. Goodacre
S.G.D.	...	...	S. Grant-Dalton
A.S.G.	...	...	A. S. Grove
K.G.	...	...	Miss K. Gwillim
G.G.L.H.	...	...	G. G. L. Hadow
C.H.	...	...	C. Hartley
R.P.H.D.	...	...	R. P. Hart-Dyke
T.N.H.S.	...	...	T. N. Hart-Smith, Esq.
M.B.L.	...	...	M. B. Lloyd
W.H.M.	...	...	W. H. Macdonald, Esq.
P.H.M.	...	...	P. H. Maddock
W.M.	...	...	W. Mansell, Esq.
G.T.K.M.	...	...	G. T. K. Maurice
A.M.J.	...	...	A. Meyrick-Jones
H.P.M.	...	...	H. P. Mullens
L.C.W.O.	...	...	L. C. W. Ogbourne
G.E.O.	...	...	Miss G. E. Ormerod
E.A.O.	...	...	Miss E. A. Ormerod
M.P.	...	...	Miss Preston
E.P.	...	...	Miss E. Preston

H.R.	...	...	H. Richardson, Esq.
B.W.R.	...	...	B. W. Rickards
H.B.R.	...	...	H. B. Rickards
G.S.R.	...	...	G. S. Roupell
C.S.	...	...	Rev. C. Soames
J.S.	...	...	Rev. J. Sowerby
C.H.S.	...	...	C. H. Stileman
E.F.T.	...	...	E. F. im Thurn, Esq.
O.F.W.	...	...	O. F. Waterfield
J.P.W.	...	...	Rev. J. P. Way
J.S.W.	...	...	J. S. Wilson
H.W.	...	...	H. Woolner
F.W.Y.	...	...	F. W. Yeates

CULTIVATED SPECIES.

- Lilao (*Eyringa vulgaris*), May 7, H.R.
 Laburnum (*Oytisus Laburnum*), May 14.
 Scarlet Ribes (*Ribes Sanguineum*), March 21.
 Cornel Tree (*Cornus Mascula*), March 4, T.N.H.S.
 Bladdernut (*Staphylea pinnata*), May 8.
 Honeysuckle (*Lonicera Caprifolium*), full May 29.
 Larch (*Laris Europæa*), March 16, P.H.M.
 Winter Aconite (*Eranihys hiemalis*), Feb. 8.
 Corydal (*Corydalis solida*), March 14.
 Horse Chestnut (*Æsculus Hippocastanum*), May 7, P.H.M.
 Syringa (*Philadelphus coronarius*), June 18, A.E.A.
 Snowberry (*Symphoricarpus racemosos*), June 5, B.W.R.
 Mountain Ash (*Pyrus Aucuparia*), May 12.
 Rye, May 21.
 Wheat, June 18, J.S.W.
 Farley, June 18, A.E.A.
 Oat, June 25, A.E.A.

- Anemone**
 nemorosa ... Mch. 1, K.G.
- Myosurus**
 minimus ... Ap. 30.
- Ranunculus**
 peltatus Ap. 30.
 penicillatus Ap. 10.
 Drouetii full Jn. 28, H.G.G.
 Flammula Jy. 14.
 auricomus... Mch. 15, K.G.
 acris Ap. 12.
 repens My. 5, L.C.W.O.
 bulbosus ... Ap. 10.
 parviflorus My. 9,
 arvensis ... My. 29.
 Ficaria Feb. 20.
- Caltha**
 palustris ... Feb. 28, J.S.W.
- Helleborus**
 viridis ... Mch. 6.
- Aquilegia**
 vulgaris My. 23, E.K.C.
- Papaver**
 Rhoeas Jn. 18, J.S.W.
 dubium
 a. Lamottei Jn. 28.
 b. Lecoqii Jn. 25, A.S.G.
 Argemone... My. 29, O.E.
- Chelidonium**
 majus My. 3.
- Fumaria**
 confusa Jy. 2, A.E.A.
 officinalis ... May 15, E.K.C.
- Raphanus**
 Raphanis-
 trum My. 29, H.G.G.
- Sinapis**
 arvensis ... My. 5, E.K.C.
 alba My. 17.
- Brassica**
 oleracea ... Ap. 29.
- Butabaga ... Ap. 20, A.S.G.
 Rapa Ap. 18.
- Diplotaxis**
 muralis My. 18, E.K.C.
- Sisymbrium**
 officinale ... My. 29.
 Alliaria Ap. 18.
- Cardamine**
 pratensis ... Ap. 8, K.G.
 hirsuta Feb. 24, E.F.T.
 sylvatica ... My. 3.
- Arabis**
 thaliana ... about My. 5.
- Barbarea**
 vulgaris..... May 3,
- Nasturtium**
 officinale ... Jn. 11, P.H.M.
- Armoracia**
 rusticana ... My. 30, A.S.G.
- Draba**
 verna about Mch. 6.
- Thlaspi**
 arvense My. 12.
- Capsella**
 Bursa-pasto-
 ris Feb. 28, H.G.G.
- Lepidium**
 campestre... My. 18, F.S.A.
- Senebiera**
 Coronopus Jn. 14.
- Helianthemum**
 vulgare ... May 23, H.G.G.
- Viola**
 odorata Mch. 7, G.G.L.H.
 hirta Mch. 18, P.S.B.
 sylvatica
 a Riviniana Mch. 24, P.S.B.
 b Reichenba-
 chiana ... Ap. 4, G.S.R.
 canina by May 27.
 tricolor May 15, R.E.F.

- arvensis* ... Mch. 25, W.J.V.B.
Polygala
vulgaris ... May 8, F.S.A.
oxyptera ... by May 23, R.W.R.
depressa ... May 29.
calcareo ... Ap. 30, C.E.C.
Silene
inflata Jn. 1.
Lychnis
vespertina May 2, W.H.M.
diurna Ap. 28.
Flos-cuculi Jn. 5, P.H.M.
Githago..... Jn. 27.
Moenchia
erecta Jn. 5, G.W.D.L.
Cerastium
glomeratum Ap. 17, H.G.G.; Jn. 29.
triviale Mch. 30.
Stellaria
media Feb. 12.
Holostea ... Ap. 1, R.W.R.
graminea ... May 21.
uliginosa ... May 15, E.K.C.
Arenaria
trinervis ... Ap. 28.
serpyllifolia Mch. 30, Jn. 19.
Sagina
apetala May 13.
procumbens May 5.
Spergula
arvensis ... Jn. 29.
Scleranthus
annuus Ap. 17.
Hypericum
perforatum Jy. 15.
tetrapterum Jy. 4, (cult.)
humifusum Jy. 2, E.K.C.
pulchrum ... Jy. 6.
hirsutum ... Jy. 10, P.H.M.
- Malva**
moschata ... Jy. 15, G.W.D.L.
sylvestris .. Jn. 9, H.G.G.
rotundifolia Jn. 24,
Tilia
intermedia about Jy. 14, A.E.A.
Linum
catharticum May 21.
Geranium
phasum by May, 23, A.E.A.; E.K.C.
pratense ... May 30, A.E.A.
pyrenaicum May 30, J.S.W.
molle Ap. 20.
dissectum... May 27, E.K.C.
columbinum May 28.
lucidum..... May 12, F.S.A.
Robertianum Ap. 23, W.H.M.
Oxalis
Acetosella... Mch. 18, R.W.R.
Ilex
Aquifolium May 15, A.E.A.; H.W.
Euonymus
europæus .. May 22, R.W.R.
Rhamnus
cathartica May 29, A.S.G.
Acer
Pseudo-platanus..... May 6, A.E.A.
campestre... May 15, A.E.A.
Ulex
europæus ... Feb. 28, E.K.C.; by Sept. 29.
Genista
anglica May 22, P.H.M.
tinctoria ... Jn. 18, P.H.M.
Sarothamnus
scoparius ... May 21.
Ononis
arvensis Jy. 10.

- Anthyllis**
vulneraria... May 17, M.A.B.; May 23, F.W.Y.
- Medicago**
lupulina ... May 5, E.K.C.
- Melilotus**
officinalis ... Jy. 10, E.N.G.
- Trifolium**
pratense ... Ap. 23.
medium..... Jy. 10.
incarnatum full May 29.
hybridum ... Jn. 3, A.E.A.
repens May 23, E.K.C.
procumbens Jn. 4.
minus Ap. 28, C.E.C.
- Lotus**
corniculatus May 15. P.H.M.
- Astragalus**
glycyphylus by Jy. 10.
- Hippocrepis**
comosa May 23, E.K.C.
- Onobrychis**
sativa..... May 22, A.E.A.
- Vicia**
hirsuta May 3.
tetrasperma Jn. 4.
Cracca by Jy. 2, E.K.C.
sylvatica ... Jn. 10, E.N.G.
sepium Ap. 18.
sativa May 12.
angustifolia Jn. 12.
- Lathyrus**
pratensis ... May 30, E.K.C.
sylvestris ... by Jy. 10, E.N.G.
- Orobus**
tuberosus ... by Ap. 20.
- Prunus**
spinosa Ap. 20, C.E.C.
Avium about Ap. 20, C.M.B.
- Spiræa**
Ulmaria ... Jn. 14.
- Filipendula** Jn. 15, (cult.)
- Agrimonia**
Eupatoria ... Jn. 13, E.K.C.
- Sanguisorba**
officinalis ... full, Jy. 10, E.K.C.
- Poterium**
Sanguisorba May 8, B.W.B.
- Alchemilla**
arvensis ... Mch. 10.
vulgaris..... May 5, U.G.G.
- Potentilla**
Fragarias-
trum Feb. 28.
Tormentilla May 6, E.K.C.
reptans May 28,
anserina ... May 6,
- Fragaria**
vesca Ap. 17.
- Rubus**
Idæus..... May 23, A.S.G.
discolor..... Jy. 19.
corylifolius Jn. 29.
cæsius May 23, A.E.A.
- Geum**
urbanum ... May 15, H.G.G.
intermedium May 6, T.N.U.S.
rivale..... Ap. 3^d, E.P.
- Rosa**
tomentosa .. Jn. 12, R.W.B.
rubiginosa... Jy. 14.
canina May 29, E.K.C.
arvensis..... By Jn. 22.
- Cratægus**
Oxyacantha May 18th, R.W.B.
- Pyrus**
Malus..... Ap. 29, C.E.C.
- Epilobium**
angustifo-
lium Jy. 3, E.N.G.
hirsutum .. Jy. 10, H.R. (Binck-
knoll), Jy. 19.

- parviflorum* Jn. 29, E.N.G. (Chisel-
don); Jy. 21,
A.E.A.
montanum Jn. 18, E.N.G.
Circæa
lutetiana ... Jn. 29, H.E.
Callitriche
verna Ap. 28.
platycarpa full Jn. 14.
Bryonia
dioica May 31, A.S.G.
Ribes
Grossularia Mch. 24.
rubrum Mch. 16, Mch. 28,
P.H.M.
Sedum
Fabaria Aug. 1 (cult.)
acre Jn. 20.
reflexum ... Jy. 6,
Sempervivum
tectorum ... Jy. 19.
Saxifraga
tridactylites Ap. 10.
granulata .. Ap. 28.
Chrysosplenium
oppositifo-
lium full, May 12.
Sanioula
europæa May 14, W.H.M.
Helosciadium
nodiflorum Jy. 2, A.E.A.
inundatum Jy. 14.
Ægopodium
Podagraria May 29, H.G.G.
Hunium
flexuosum ... May 23, E.K.C.
Pimpinella
Saxifraga ... (May 27, E.K.C.);
Jy. 14, T.N.H.S.
Sium
- angustifo-*
lium Jy. 31.
Ænanthe
fistulosa Jn. 30 (cult.)
crocata Jn. 23, J.S.W.
Æthusa
Cynapium ... Jy. 2, A.E.A.
Silene
pratensis ... full, Jy. 10, E.K.C.
Angelica
sylvestris ... Jy. 29.
Pastinaca
sativa Jn. 24.
Heracleum
Sphondylium May 27, J.S.W.
Daucus
Carota Jn. 19.
Torilis
Anthriscus Jn. 24.
Chærophyllum
sylvestre ... Ap. 15, A.E.A.
temulum ... May 28.
Scandix
Pecten-
Veneris ... May 5, A.E.A.
Conium
maculatum Jy. 15.
Hedera
Helix about Sep. 13, P.H.M.
Cornus
sanguinea ... Jn. 21, G.W.D.L.
Adoxa
Moschatel-
lina Mch. 5, H.G.G.
Sambucus
nigra Jn. 5, B.W.B.
Viburnum
Opulus May 29, J.S.W.
Lantana .. Ap. 28, C.E.C.
Lonicera

- hirtus..... Jy. 2.
 hispidus ... May 23, A.E.A.
 autumnalis Jn. 19.
 Tragopogon
 minor May 18, F.S.A.
 Taraxacum
 officinale ... Mch. 9, E.K.O.
 Sonchus
 asper Jn. 10, E.K.C.
 arvensis... .. by Jy. 30.
 Crepis
 virens May 29, E.N.G.
 Hieracium
 Pilosella ... May 18, F.S.A.
 vulgatum ... Jn. 30, E.N.G.
 boreale by Jy. 30.
 Phyteuma
 orbiculare ... Jy. 10, E.K.C.
 Campanula
 glomerata ... Jy. 8, E.K.C.
 Trachelium Jy. 10 (Binck-knoll),
 P.H.M.
 rotundifolia Jy. 8, E.K.C.
 Specularia
 hybrida full, Jy. 14, T.N.H.S.
 Calluna
 vulgaris..... Jy. 25, A.E.A.
 Fraxinus
 excelsior ... Ap. 18.
 Ligustrum
 vulgare Jn. 26, H.G.G.
 Vinca
 major May 21, A.E.A.
 minor..... Mch. 13.
 Erythræa
 Centaurium Jy. 15.
 Menyanthes
 trifoliata ... May 8,
 Convolvulus
 arvensis..... June 12 (Savernake),
 R.W.B.; Jn. 24.
 sepium Jy. 19
 Solanum
 Dulcamara May 27, J.S.W.
 Verbascum
 Thapsus ... Jn. 25, E.K.C.
 Scrophularia
 Babisiæ Jn. 19.
 nodosa May 28.
 Linaria
 Cymbalaria several May 2.
 vulgaris..... Jy. 1, E.K.C.; Jy. 10.
 minor Jn. 24, A.S.G.
 Veronica
 hederifolia .. Mch. 21, P.S.B.;
 Oct. 6, J.S.
 polita..... Feb. 11, H.G.G.
 Buxbaumii Feb. 8, A.E.A.
 arvensis..... Ap. 20.
 serpyllifolia Ap. 5.
 officinalis .. Jn. 8, A.E.A.
 Chamædrys Ap. 23, W.H.M.
 montana ... May 8.
 scutellata ... Jn. 7, G.E.O.
 Anagallis ... Jn. 14.
 Beccabunga May 23, C.E.B.
 Euphrasia
 officinalis ... Jn. 18, H.B.R.
 Bartsia
 Odontites ... Jy. 1, E.K.C.
 Pedicularis
 sylvatica ... May 2, W.H.M.
 Rhinanthus
 Crista galli May 14, H.P.M.
 Melampyrum
 pratense ... May 28,
 Lathræa
 squamaria... Mch. 19, J.S.W.
 Orobanche
 elatior full, Jy. 19.
 minor Jy. 14, T.N.H.S.
 Mentha

hirsuta Aug. 6, W.H.M.
arvensis..... Jy. 25, A.S.G.
Thymus
Serpyllium ... Jn. 5, E.A.O.
Calamintha
Olinopodium Jy. 10, G.W.D.L.
Nepeta
Cataria Jy. 18 (cult.)
Glechoma ... Moh. 21, S.G.D.
Prunella
vulgaris..... Jn. 11, R.W.R.
Ballota
nigra Jn. 29 (Ohiseldon),
A.E.A.; Jy. 22,
A.S.G.
Stachys
Betonica ... Jn. 24.
palustris ... Jy. 24, R.W.R.
sylvatica ... Jn. 4, E.K.O.
Galeopsis
Ladanum ... Jy. 18, E.K.O.
Tetrahit Jn. 27, A.E.A.
Lamium
amplexicaule Jy. 6.
purpureum Feb. 8, A.E.A.
album Moh. 7, F.W.Y.
Galeobdolon Ap. 20.
Ajuga
reptans Ap. 23, E.P.
Hobium
vulgare full, Jy. 4, E.K.O.
Lithospermum
officinale ... May 12.
arvense May 2, W.H.M.
Myosotis
palustris ... May 29, (Pewsey),
J.S.W.; Jn. 12.
arvensis ... Moh. 19, H.B.B.
collina Ap. 17.
versicolor ... about May 5.
Anchusa
arvensis..... May 29, F.S.A.

Borago
officinalis ... Jy. 2, (cult.)
Symphytum
officinale ... Ap. 24, W.H.M.
aspernum full Jn. 1, A.E.A.
Cynoglossum
officinale ... Jn. 3, R.W.R.
Primula
vulgaris ... Feb. 11, H.G.G.
officinalis ... Ap. 4, R.P.H.D.
Lysimachia
Nummularia by Jn. 29, (Ohisel-
don) P.H.O.,
nemorum ... May 11, F.S.A.
Anagallis
arvensis ... Jn. 19.
Plantago
major..... Jn. 8, F.S.A.
media May 13, J.W.A.
lanceolata... by Ap. 28.
Chenopodium
album Jn. 19.
B. Henricus Ap. 28.
Atriplex
angustifolia Jy. 14.
Rumex
conglomera-
tus Jy. 10.
nemorosus Jn. 24.
obtusifolius May 29, E.K.O.
crispus May 27, J.S.W.
Hydrolapa-
thum Jy. 30.
Acetosa..... May 17.
Acetosella... by May 12.
Polygonum
Convolvulus Jn. 24.
aviculare ... Jn. 4, E.K.O.
Persicaria... Jy. 11, A.E.A.
amphibium Jy. 31.
Bistorta... May. 26, M.P.
Daphne

- Mezereum*... Feb. 28, J.S.W.
Laureola ... Mch. 4, A.E.A.
Buxus
 sempervirens Mch. 10, H.G.G.
Euphorbia
 Helioscopia May 28,
 amygda-
 loides ... Ap. 28.
 Peplus Jn. 21.
 exigua Jn. 24, A.S.G.
Mercurialis
 perennis ... barren Feb. 26, E.K.C.
 fertile Mch. 7, G.G.L.H.
Urtica
 dioica..... ... May 28.
 urens May 2.
Ulmus
 suberosa ... Mch. 23.
 montana ... Mch. 9.
Quercus
 Robur May 28, H.G.G.
Corylus
 Avellana ... barren Feb. 21, J.S.W.
 fertile Feb. 14, C.E.C.
Salix
 triandra ... Mch. 28.
 viminialis ... Mch. 7, G.T.K.M.
 caprea Mch. 22.
Pinus
 sylvestris ... May 29, E.K.C.
Taxus
 baccata Mch. 3.
Sparganium
 simplex Jy. 16, G.W.D.L.
Arum
 maculatum Ap. 20.
Zannichellia
 palustris ... full Jy. 10, (Binokknoll)
Alisma
 Plantago ... Jy. 11, E.K.C.
Orobis
 pyramidalis Jy. 8, E.N.G.
 ustulata ... Jy. 14, E.N.G.
Morio..... May 8, B.W.B.
 mascula..... Ap. 20, C.S.
 incarnata ... Jn. 7, G.E.O.
 maculata ... Jn. 5, E.A.O.
Gymnadenia
 conopsea ... Jn. 14, E.N.G.
Habenaria
 viridis Jy. 4, H.G.G.
 bifolia (Jn. 1, A.E.A.)
 chlorantha.. Jn. 5, E.A.O.
Herminium
 Monorchis Jy. 13, E.N.G.
Listera
 ovata May 15, (Ramsbury),
 A.M.J.; May 28.
 A.E.A.
Neottia
 Nidus-avis May 30, J.P.W.
Cephalanthera
 grandiflora bud May 29, A.S.G.
Iris
 fetidissima Jy. 9, (cult).
 Pseudacorus Jn. 13, W.H.M.
Narcissus
 Pseudo-
 narcissus Mch. 9, E.N.G.
Galanthus
 nivalis Feb. 18, E.K.C.
Tamus
 communis... Jn. 1, J.S.W.
Paris
 quadrifolia full May 15, H.C.B.F.
Polygonatum
 multiflorum May 15.
Convallaria
 majalis May 2.
Ruscus
 aculeatus ... Ap. 10.
Scilla
 nutans Ap. 28, W.H.M.
Allium

- ursinum..... May 12.
Luzula
 pilosa Mch. 12.
 campestris Mch. 25.
Juncus
 effusus Jn. 30, E.N.G.
 glaucus Jy. 19.
 lamprocarpus Jy. 10, (Binck-knoll)
 E.N.G.
 bufonius ... Jy. 10 (Binck-knoll)
Scirpus
 palustris ... Jn. 15, T.N.H.S.
 lacustris..... Jy. 30.
Carex
 paniculata... May 8.
 muricata ... May 23, P.H.M.
 ovalis full June 29, T.N.H.S.
 acuta full May 29, M.B.L.
 glauca Ap. 28.
 præcox Ap. 4, E.P.J.F.M.F.
 pendula ... May 22, (cult.)
 sylvatica ... May 8.
 hirta May 28.
 paludosa ... May 8.
 riparia Ap. 28.
Anthoxanthum
 odoratum ... Ap. 11.
Digraphis
 arundinacea Jn. 14.
Phalaris
 canariensis Jn. 14, G.T.K.M.
Alopecurus
 agrestis May 15, R.H.F.
 geniculatus Jn. 14.
 pratensis ... Ap. 18.
Phleum
 pratense ... Jn. 19.
Agrostis
 alba Jn. 29.
 vulgaris..... Jn. 24.
Milium
 effusum Ap. 20.
- Aira**
 cæspitosa ... Jn. 14.
Avena
 flavescens ... Jn. 12.
 pubescens ... May 2.
 pratensis ... May 21.
 elatior Jn. 1.
Holcus
 mollis Jn. 24.
 lanatus May 23, J.S.W.
Koeleria
 cristata May 29.
Melica
 uniflora Ap. 20.
Catabrosa
 aquatica ... Jn. 14.
Glyceria
 fluitans Jn. 12, A.E.A.
 plicata May 29, F.S.A.
 aquatica ... Jn. 24.
Sclerochloa
 rigida..... Jy. 2, E.K.C.
Poa
 annua Feb. 28, A.E.A.
 memoralis ... Jn. 17, J.S.W.
 pratensis ... Ap. 20.
 trivialis May 28.
Brisa
 media..... May 23, E.K.C.
Cynosurus
 cristatus ... May 28.
Dactylis
 glomerata... May 8.
Festuca
 sciuroides ... Jn. 24.
 ovina May 12.
 rubra May 2.
 elatior full Jy. 10.
 b. arundi-
 nacea Jn. 14.
 pratensis ... Jn. 19.
Bromus

giganteus ... Jy. 9.
 asper Jn. 12.
 erectus Ap. 18.
 sterilis May 15. O.H.
 racemosus... Jn. 14.
 commutatus Jy. 9.
 mollis..... Ap. 28.
 Brachypodium
 sylvaticum Jy. 8.
 Triticum
 caninum ... Jy. 9.
 repens Jn. 24.

Lolium
 perenne May 7. P.H.M.
 italicum ... Jn. 19.
 Hordeum
 pratense..... Jn. 29, A.S.G.
 Botrychium
 Lunaria May 9, P.H.M.
 Equisetum
 arvense Ap. 10.
 palustre..... May 29, E.K.C.
 limosum ... May 22, A.E.A.

ORNITHOLOGICAL REPORT FOR 1880.

ORNITHOLOGY certainly does not flourish in the College; and though we have managed to secure a very fair list of "notices," it is mainly owing to Mr. Coleman and C. E. Cooper that we have done so. It seems to be a fixed idea that there is nothing to be done in Ornithology when "egging season" is over, and until we get an Ornithologist among the Masters we shall always have difficulty in keeping this branch of Natural History even moderately represented.

The extremely severe winter of 1879—1880 caused great mortality among the Birds, or, at all events, their numbers were perceptibly diminished in the earlier part of the year; and as the foliation of the trees was very late, the nesting began before the few remaining birds could get proper shelter, consequently bird's nesting was painfully destructive, one party (not College boys) alone taking as many as 49 eggs on one afternoon early in April. This might possibly show that the destruction of the old birds was not as great as appeared at first sight.

The *migration* of some birds has been curious. In the Eastern counties, Mr. Cordeaux writes "We must look to general causes for the apparent scarcity of birds. I know in this district all our birds left us 'helter skelter' on the outbreak of the severe weather in December. Up to that time, except in the case of the Turdidae, we had no apparent scarcity; as for larks the rush on to our East Coast this autumn, throughout October, November, and half December was tremendous, day by day, and hour by hour; no danger of the lark either becoming extinct or even scarce as some writers in the *Times* surmise." In a subsequent letter he says "Larks continued to come by thousands up to the 27th December. I daresay you have seen remarks in the papers about the scarcity of Fieldfares. They have been most abundant since about January 20th in this district, immense numbers crossed during the last fortnight in January—old birds. I suppose that a reason for this may be the comparative mildness of the Scandinavian winter compared with what we have experienced in the middle and southern zones of Europe."

Larks certainly were not scarce about Marlborough. At Avebury, Mr. Kemm writes "Larks have not been so numerous as usual during the late winter. There has been little for them to feed on *here*, and perhaps that accounts for their being so abundant near Marlborough, as they would have plenty of young grass in the meadows near the Kennett to feed on. Snipe have been plentiful. A large flock of wild geese was about here for two or

three days in December. Fieldfares, usually so very common, have scarcely made an appearance this winter; I have only seen one. Blackbirds, thrushes, and red-wings have also been very scarce, as well as most of the smaller birds, with the exception of the house sparrow, which has been as plentiful as ever."

From these few quotations it will be seen that a vast deal more than mere egg-collecting might employ the spare time of any interested in *Ornithology*.

Two flocks of wild geese (50 or 60 each) were seen flying near the town from E. to W. on 5th December, 1879, on which day a Goosander was shot at Stitchcomb by Mr. R. Butler, Junr.

The only other rarities, of which I have heard, and which has not been hitherto noticed is the *Black Tern*, two specimens of which were shot about the middle of May, one at Hungerford and the other at Ramsbury.

Peregrine Falcon—Shot near the Cemetery, Nov. 12.

Hen Harrier—Shot on Erchfont Downs, Dec. 31.

Names of those whose initials occur in the following list :—

A.E.A.	...	...	A. E. Aldworth
E.B.B.	...	...	E. B. Badcock
L.E.C.	...	...	L. E. Colley
C.E.C.	...	...	C. E. Cooper
E.P.J.F.M.F.	...	...	E. P. J. F. M. Filgate
H.G.G.	...	...	H. G. Goodacre
A.S.G.	...	...	A. S. Grove
C.H.	...	...	C. Hartley
A.S.V.H.	...	...	A. S. V. Hume
P.H.M.	...	...	P. H. Maddock
L.C.W.O.	...	...	L. C. W. Ogbourne
E.G.W.	...	...	E. G. Waddilove
A.A.W.	...	...	A. A. Wansey
J.S.W.	...	...	J. S. Wilson

Kestrel—3 eggs, May 23, C.E.C.

Sparrow Hawk—eggs, May 14, Coleman

Long-eared Owl—4 eggs, March 25, A.A.W.

Tawny Owl—eggs, March 27, E.P.J.F.M.F.

Spotted Flycatcher—1 egg, June 5, C.E.C.

Missel Thrush—4 eggs, March 25, L.C.W.O.

Song Thrush—eggs (set), April 4, Coleman; young, May 3, C.E.C.

Blackbird—eggs (set), March 20, Coleman

- Hedge Accentor—4 eggs, April 9, V. Head ; young, May 19, C.E.C.
 Redbreast—4 eggs, April 9, V. Head ; young, April 30, Coleman
 Redstart—[2 eggs, May 15, J.S.W.]
 Wheatear, seen March 28, H.G.G.
 Sedge Warbler—2 eggs, May 27, C.E.C. ; young, June 7, C.E.C.
 Reed Warbler, 5 eggs, June 8, C.H.
 Garden Warbler—2 eggs, June 5, C.E.C.
 Whitethroat—singing, May 8, Coleman ; 1 egg, June 5, C.E.C.
 Greater Tit—eggs, April 26, Coleman ; [young, May 27, C.E.C.]
 Blue Tit—8 eggs, May 6, Coleman
 Cole Tit—14 eggs, May 4, C.E.C.
 Long-tailed Tit—9 eggs, April 9, V. Head
 Pied Wagtail—eggs, May 18, Coleman
 Meadow Pipit—5 eggs, June 9, A.S.G.
 Black-headed Bunting—eggs, May 10, Coleman
 Yellow Bunting—eggs, May 14, Coleman
 Chaffinch—8 eggs, April 27, C.E.C. ; young, May 23, H.G.G.
 House Sparrow—4 eggs, May 11, C.E.C. ; young, June 9, C.E.C.
 Greenfinch—3 eggs, May 1, F. Head
 Goldfinch—5 eggs, May 18, P.H.M.
 Linnet—5 eggs, May 17, C.E.C. ; young, June 20, C.E.C.
 Starling—3 eggs, May 4, C.E.C. ; young (just hatched), May 14, C.E.C.
 Rook—building, March 5 ; 4 eggs, March 18, L.E.C. ; young, April 20, C.E.C.
 Jackdaw—4 eggs, April 24, C.E.C. ; young (4 days), May 14, C.E.C.
 Magpie—1 egg, April 16, C.E.C.
 Jay—eggs, May 14, Coleman
 Green Woodpecker—1 egg, May 25, C.E.C.
 Lesser Spotted Woodpecker—captured in Savernake Forest Dec. 21.
 Creeper—1 egg May 4, C.E.C.
 Wren—3 eggs May 24, C.E.C. ; 6 eggs July 2, P.H.M. ; young June 9, C.E.C.
 Nuthatch—8 eggs May 4, C.E.C.
 Cuckoo—heard in S. Forest April 11, Coleman ; heard April 20, seen April 18,
 C.E.C. ; egg in Reed Warbler's nest May 6, Coleman.
 Kingfisher—5 eggs May 18, Coleman.
 Swallow—seen April 11, Coleman ; 1 egg by May 24, C.E.C. ; feeding young,
 Oct. 26, E.B.B. ; departed by Nov. 10, Coleman.
 Martin—seen April 11, Coleman ; seen Nov. 18, E.B.B.
 Sand Martin—seen April 15, C.E.C.
 Swift—seen May 11, C.E.C. ; 3 eggs June 2, C.E.C. ; young June 24, C.E.C.
 Ring Dove—2 eggs April 6, C.E.C.
 Stock Dove—1 egg March 22, C.E.C. ; young (reared) June 8, C.E.C.

Partridge—paired Feb. 24, E.G.W.

Red-legged Partridge—10 eggs May 6, Coleman.

Peewit—4 eggs, April 8, A.S.V.H.

Land Rail—one killed by telegraph wire April 20, Coleman; heard May 1,
C.E.C.

Moorhen—1 egg April 26, C.E.C.

Wild Duck—3 seen Feb. 28, A.E.A.

Little Grebe—eggs May 10, Coleman.

Widgeon—2 shot June 21.

Puffin—shot in Savernake Forest.

Wryneck—shot April 17.

Stone Curlew—shot April 22.

Black Tern—shot May 14.

Yellow Wagtail—seen about March 28, H.G.G.

Short-eared Owl—shot May 6; four more during the Autumn, Coleman.

[With respect to the notice of the Golden Plover's eggs, recorded in last year's Report as being taken on June 9, the Rev. A. C. Smith writes "Can this be correct? I never heard of the *Golden* Plover breeding in Wilts, or in any of the Southern Counties of England. The *Great* Plover, which in breeding plumage so much resembles it, does breed on the Downs of Wilts occasionally: may not this be the bird intended?" Doubtless the error alluded to has been made, and the word *Great* should be substituted for *Golden* in the Report of last year.]

ENTOMOLOGICAL REPORT.

LEPIDOPTERA.

THE following list, though not as long as it might be, is yet longer than what we generally have, and shows good work on the part of some members. The great prize of the year was the Camberwell Beauty (*Vanessa antiopa*) captured on the 30th August by Mr. Coleman. There was a little sugaring, but that on the 17th June was alone successful. The difficulties of attending on a sugaring evening are such, that it will probably be of rare occurrence, but the advantages are so great that if members and masters can encounter the trouble of going out of an evening, our List of Captures will certainly be very considerably increased and new species almost certainly added to the List.

Name of those whose initials occur in the following list :—

F.S.A.	..	...	F. S. Alston
A.J.B.	...	...	A. J. Badcock
V.E.B.	...	...	V. E. Barrow
W.F.B.	...	...	W. F. Blandford
E.K.O.	...	...	E. K. Chambers
C. ...	...	...	Mr. Coleman
C.E.C.	...	...	C. E. Cooper
E.B.D.	...	...	E. B. Dawson
A.E.D.	...	...	A. E. Dawson
A.G.G.	...	...	A. G. Grenfell
W.T.G.	...	...	W. T. Grenfell
A.S.G.	...	...	A. S. Grove
J.Z.M.H.	...	...	J. Z. M. Hamilton
W.E.H.	...	...	W. E. Hardy
C.H.	...	...	C. Hartley
C.P.K.	...	...	C. P. Koelle
W.H.M.	...	...	W. H. Macdonald, Esq.
P.H.M.	...	...	P. H. Maddock
N.M.	...	...	N. Manders, Esq.
G.T.K.M.	...	...	G. T. K. Maurice
E.M.	...	...	E. Meyrick, Esq.
A.G.P.	...	...	A. G. Palgrave
B.W.B.	...	...	B. W. Rickards

H.B.B.	...	...	H. B. Rickards
A.J.S.	...	...	A. J. Shears
G.A.C.S.	...	...	G. A. C. Sim
T.N.H.S.	...	...	T. N. Hart-Smith, Esq.
W.G.G.S.	...	...	W. G. G. Stokes
W.N.V.	...	...	W. N. Villiers
J.S.W.	...	...	J. S. Wilson

RHOPALOCERA.

Gonepteryx Rhamni—Mch. 10,
J.S.W.; May 20, P.H.M.;
Sep. 27.

Colias Edusa—Aug. 26, C.

Pieris Brassicæ—June 11, A.J.B.

Rapæ Mch. 5, J.Z.M.H.; Mch.
28, P.H.M.

Napi—May 13, P.H.M.

Anthocharis Cardamines—May 14,
C.E.C.

Arge Galathea—July 10, P.H.M.

Lasiommata Ægeria—May 1, C.E.C.
Megæra—May 17, P.H.M.

Hipparchia Janira—July 3, P.H.M.
Tithonus—May 18, P.H.M.

Hyperanthus—June 27, A.S.G.

Cœnonympha Pamphilus—May 18,
F.S.A.

Cynthia Cardui—May 30, W.F.B.

Vanessa Atalanta—June 26, P.H.M.

Io—May 15, J.Z.M.H.

Antiope—Aug. 30, C.

Polychloros—Ap. 17, W.H.M.

Urticæ—Mch. 9, A.E.D.

Argynnis Paphia—July 15, P.H.M.

Adippe—July 10, W.G.G.S.

Aglais—July 3, W.E.H.; W.T.G.

Selene—May 22, P.H.M.

Euphrosyne—May 17, G.A.C.S.

Nemeobius Lucina—June 8, A.J.S.

Thecla Betulæ—Aug. 6 (plentiful) C.

W-album—July 22 (bred) P.H.M.

Rubi—May 20, F.S.A.

Chrysophanus Phlæas—May 24,
P.H.M.

Polyommatus Alsus—May 23, E.K.C.

Alexis—May 18, W.F.B., F.S.A.

Thymele Alveolus—May 12, F.S.A.

Thanaos Tages—May 17, P.H.M.

Pamphila Linea—July 18, P.H.M.

Sylvanus—June 5, P.H.M.

HETEROOCERA.

SPHINGINA.

Procris Geryon—July 20, N.M.

Anthrocera Filipendulæ—July 17,
W.F.B.

Smerinthus Populi—June 29, Mr.
Velvin.

Tiliæ—Ap. 11 (bred) P.H.M.

Chærocampa Elpenor—June 20 (bred)
N.M.

Macroglossa Stellatarum—Sep. 29,
W.F.B.

BOMBYCINA.

Hepialus Hectus—June 30, P.H.M.

Lupulinus—July 6, P.H.M.

Humuli—June 10, W.F.B.

Velleda—June 17, F.S.A.

Sylvinus—June 14.

Cerura Vinula—May 16, P.H.M.

Stauropus Fagi—July 1, P.H.M.

Notodonta Ziczac—June 15, W.F.B.

Pterostoma Palpina—Mch. 13, P.H.M.

Leiocampa Dictæoides—June 1,
P.H.M.

Lophopteryx Camelina—Ap. 11 (*bred*)
P.H.M., May 27, P.H.M.

Diloba Cæruleocephala—Sep. 26,
N.M.

Petasia Cassinea—Oct. 14, P.H.M.

Pygæra Bucephala—July 6, F.S.A.

Dasychira Pudibunda—May 23, F.S.A.

Demas Coryli—May 18, P.H.M.; larva
Sep. 28, N.M.

Orgyia Antiqua—Sep. 7, N.M.

Lithosia Aureola—May 15, W.F.B.

Gnophria Rubricollis—June 8, P.H.M.

Aretia Caja—July 18, V.E.B.

Phragmatobia Fuliginosa—Aug. 10,
N.M.

Spilosoma Menthastri—May 6, C.E.C.

Lubricepeda—May 14, W.F.B.

Diaphora Mendica—June 10, E.K.C.

Callimorpha Jacobææ—June 12,
A.E.A., E.B.D.

Bombyx Quercus—July 23 (*b e*)
P.H.M.; July 26.

Odonestis Potatoria—June 30, E.B.D.

Cilix Spinula—May 29, F.S.A.

Platypteryx Lacertinaria—June 26,
W.F.B.

Drepana Falcataria—June 18, P.H.M.
Unguicula—May 8, F.S.A.

NOCTUINA.

Thyatira Batis—June 17.

Cymatophora Duplaris—June 17.

Flavicornis—Mch. 19, W.F.B.

Bryophila Perla—July 10, P.H.M.

Acronycta Psi—June 5, P.H.M.

Ligustri—June 17.

Rumicis—June 17.

Leucania Turca—July 6 (*bred*) F.S.A.

Hydræcia nictitans—Sep. 5, N.M.

Xylophasia Rurea—June 5, W.G.G.S.

Polyodon—July 1, W.F.B.

Hepatica—June 17.

Mamestra Brassicæ—June 8, W.F.B.

Apamea Basilinea—June 26, P.H.M.

Oculea—June 12, C.P.K.

Miana Strigilis—June 17.

Furuncula—June 17.

Grammesia Trilinea—June 17.

Caradrina Alsines—Aug. 10, N.M.

Agrotis Suffusa—June 8, C.P.K.

Segetum—July 12, T.N.H.S.

Exclamationis—June 17.

Triphaena Interjecta—July 23, P.H.M.

Triphaena Pronuba—June 14, W.N.V.

Noctua Plecta—June 15, F.S.A.

Brunnea—June 26, P.H.M.

Festiva—June 17.

Tæniocampa Gothica—March 21,
W.G.G.S.

Stabilis—Mch. 14, P.H.M.

Anohocelis Pistacina—Oct. 27, P.H.M.

Xanthia Flavago—Sep. 28, P.H.M.

Dianthoscia Cuonbali—June 17.

Phlogophora Meticticlosa—June 1,
P.H.M.; W.F.B.

Agriopsis Aprilina—Sep. 21, P.H.M.

Euplexia Lucipara—June 15, W.F.B.

Aplecta Herbida—June 17.

Nebulosa—June 10, W.F.B.

Hadena Adusta—June 17.

Dentina—June 18, W.F.B.

Oleracea—Ap. 26 (*bred*) P.H.M.

Thalassina—May 25, F.S.A.

Xylina Rhizolitha—Oct. 17, P.H.M.

Brephos Parthenias—March 26,
A.G.G.

Abrostola Triplasia—June 10, F.S.A.

Plusia Chrysitis—June 18, A.E.A.

Iota—June 16, C.P.K.

Pulchrina—June 15, C.P.K.

Gamma—May 20, W.G.G.S.

Gonoptera Libatrix—May 24, F.S.A.;
Sep. 25, A.J.B.

- Mania typica*—Aug. 14, N.M.
Euclidia Mi—May 17, P.H.M.
 Glyphica—May 18, W.F.B.
Phytometra Aenea—May 16, P.H.M.
 GEOMETRINA.
Ourapteryx Sambucaria—July 15,
 A.S.G.; W.F.B.
Rumia Crataegata—Mch. 7, P.H.M.;
 May 8, C.E.C.
Venilia Maculata—May 23, W.F.B.
Angerona Prunaria—July 17, W.F.B.
Metrocampa Margaritata—July 3,
 F.S.A.; W.G.G.S.
Eurymene Dolobraria—May 12, A.J.S.
Pericallia Syringaria—July 1 (*bred*)
 W.F.B.
Selenia Illunaria—Ap. 1, A.G.P.
Odontopera Bidentata—May 14 (*bred*)
 C.E.C.
Ennomos Tiliaria—Aug. 8, N.M.
 Fuscantaria—Sep. 10, N.M.
 Erosaria—Aug. 20, N.M.
 Angularia—Aug. 2 (*bred*) W.F.B.
 Pennaria—Nov. 1, P.H.M.
Amphidasis Betularia—May 9,
 P.H.M.; July 8, P.H.M.
Hemerophila Abruptaria—May 5,
 F.S.A.
Boarmia Repandata—July 3, P.H.M.
 Rhomboidaria—July 18, P.H.M.
 Roboraria—July 3, F.S.A.
Tephrosia Crepuscularia—May 22,
 P.H.M.
Iodia Lactearia—May 20, W.F.B.;
 F.S.A.
Ephyra Punctaria—May 25, F.S.A.
 Trilinearia—Mch. 31, P.H.M.
 Pendularia—May 23, W.G.G.S.
Asthena Luteata—May 29, F.S.A.
Asthena Trigeminata—July 15,
 P.H.M.
 Candidata—May 22, W.G.G.S.
 Sylvata—June 3, W.F.B.
Acidalia Virgularia—June 27, W.F.B.
 Remutata—May 18, P.H.M.
 Aversata—June 8, P.H.M.
Bradyepetes Amataria—June 28,
 F.S.A.
Cabera Pusaria—May 13, W.F.B.
 Exanthemata—July 6, P.H.M.
Corycia Punctata—May 5, P.H.M.
 Taminata—May 9, P.H.M.
Halia Wavaria—Aug. 14, N.M.
Macaria Liturata—June 15, P.H.M.
Strenia Clathrata—May 18, E.K.C.
Lozogramma Petraria—May 14,
 C.E.C.
Numeria Pulveraria—May 25, F.S.A.
Fidonia Atomaria—June 13, O.V.
 Piniaria—July 2, W.G.G.S.
Minoa Euphorbiata—June 3, P.H.M.
Abraxas Grossulariata—June 27,
 H.B.B.
Ligdia Aduata—May 9, A.E.A.
Lomaspolis Marginata—May 29,
 P.H.M.
Hybernia Rupicapraia—Feb. 22,
 P.H.M.
 Leucophearia—Mch. 19, W.F.B.;
 F.S.A.
 Progemmaria—Feb. 29, P.H.M.
Anisopteryx Aescularia—Feb. 22,
 F.S.A.
Cheimatobia Brumata—Nov. 29,
 R.W.R.
Oporabia Dilutata—Oct. 17, P.H.M.
Larentia Olivaria—June 20, W.F.B.
 Didymata—July 23, P.H.M.
 Miaria—May 27, P.H.M.
Emmelesia Affinitata—May 29,
 W.F.B.; F.S.A.
 Alchemillata—July 18, P.H.M.

Albulata—May 23, W.F.B.;
 F.S.A.
 Eupithecia Valerianata—June 11,
 W.G.G.S.
 Irriguata—May 9, P.H.M.
 Castigata—[May 18, F.S.A.]
 Lariciata—May 23, W.F.B.
 Subnotata—May 25, P.H.M.
 Vulgata—May 24, A.S.G.
 Abbreviata—May 20, P.H.M.
 Rectangulata—July 13, P.H.M.
 Thera Variata—June 5, W.F.B.
 Ypsipetes Elutata—July 17, W.F.B.
 Melanthe Babiginata—July 8,
 W.F.B.
 Ocellata—May 29, W.F.B.
 Albicollata—June 12, P.H.M.
 Melanippe Unangulata—July 13,
 P.H.M.
 Rivata—June 30, P.H.M.
 Biriviata—May 11, F.S.A.
 Montanata—May 15, F.S.A.
 Fluctuata—May 9, P.H.M.
 Anticlea Derivata—May 29, W.G.G.S.
 Coremia Propugnata—May 11, F.S.A.
 Ferrugaria—May 13, F.S.A.
 Camptogramma Bilineata—June 13,
 P.H.M.
 Scotosia Vetulata—July 19, P.H.M.
 Cidaria Miata—Jan. 25, P.H.M.:
 May 5, P.H.M.
 Corylata—May 23, C.P.K.
 Russata—June 3, C.E.C.; W.F.B.
 Immanata—July 6, W.F.B.
 Suffumata—May 8, F.S.A.
 Silaceata—May 8, F.S.A.
 Fulvata—July 13, P.H.M.
 Pyraliata—July 17, W.F.B.
 Dotata—July 15, W.F.B.
 Kubolia Mensuraria—July 18, P.H.M.
 Plumbaria—July 3, P.H.M.

Odesia Chærophyllata—June 9,
 G.T.K.M.
 PYRALIDINA.
 Hypena Probosoidalis—June 15,
 W.G.G.S.
 Rivula Sericealis—July 25, P.H.M.
 Herminia Barbalis—May 25, P.H.M.;
 F.S.A.
 Nemoralis—May 25, P.H.M.
 Cataclysta Lemnata—May 29, W.F.B.
 Botys Pandalis—May 25, F.S.A.
 Lancealis—May 25, P.H.M.
 Urticata—June 13, W.F.B.
 Ebulea Sambucalis—July 10, W.G.G.S.
 Scopula Lutealis—July 13, P.H.M.
 Prunalis—July 16, P.H.M.
 Stenopteryx Hybridalis—July 3,
 P.H.M.
 Nola Cristulalis—May 8, F.S.A.
 Simaethis Fabriciana—May 11,
 F.S.A.
 Endorea Ambigualis—May 20, F.S.A.
 Pyralella—July 3, P.H.M.
 Frequentella—July 3, F.S.A.
 Aphomia Colonella—July 11, P.H.M.
 Crambus Pratellus—May 20, W.G.G.S.
 Hortuellus—July 13, P.H.M.
 Culmellus—June 30, P.H.M.
 Tristellus—July 13, P.H.M.
 Chloephora Prasinana—June 15,
 P.H.M.
 TORTRICINA.
 Enlia Ministrana—May 19, A.S.G.
 Antithesia Betuletana—June 26th,
 P.H.M.
 Cynosbatella—June 29, P.H.M.
 Pruniana—June 5, W.G.G.S.
 Tortrix Viridana—July 1, W.G.G.S.
 Forsterana—July 11, W.G.G.S.
 Bibeana—July 6, P.H.M.

Lozotsania Sorbiana—July 11,
 W.G.G.S.
Musculana—May 23, P.H.M.
Xylosteania—July 10, P.H.M.;
 C.E.C.
Rosana—July 15, P.H.M.
Ptycholoma Lecheana—July 1, P.H.M.
Pardia Tripunctana—June 3, C.E.C.
Halonota Brunnichiana—May 18,
 F.S.A.
Solandriana—Sep. 23, P.H.M.
Coccyx Hyrciniana—May 11, P.H.M.
Hedya Ocellana—June 26, P.H.M.
Dealbana—July 18, P.H.M.
Anchylopera Lundana—May 12,
 W.F.B.
Argyrotoza Conwayana—May 29,
 P.H.M.
Contaminana—Sep. 25, P.H.M.
Dictyopteryx Loeflingiana—July 18,
 P.H.M.
Crossia Bergmanniana—July 18,
 P.H.M.
Forskaleana—July 23, P.H.M.
Holmiana—July 23, P.H.M.
Peronea Comparana—Sep 25, P.H.M.
Favillaceana—Sep. 25th, P.H.M.
Hastiana—Sep. 25, P.H.M.
Teras Caudana—Sep. 25, P.H.M.
Carpocapsa Grossana—June 6, P.H.M.
Oxygrapha Literana—June 15,
 P.H.M.
Roxana Arouella—June 10, F.S.A.
Stigmonota Perlepidana—May 17,
 P.H.M.
Grapholita Ulicetana—May 14, F.S.A.
Onephasia Subjectana—July, 1,
 P.U.M.
Alternella—July 18, P.H.M.
Sericoris Lacunana—June 5, W.G.G.S.
Urticana—July 1, P.H.M.

Tortricodes Hyemana—March 14,
 F.S.A.
 TINEINA.
Chimabacche Fagella—March 28,
 W.G.G.S.
Phryganella—Oct. 24 P.H.M.
Tinea Granella—May 11, P.H.M.
Cloacella—May 27, A.S.G.
Pellionella—July 18, P.H.M.
Incurvaria Masculella—June 9, F.S.A.
Nemophora Swammerdammella—
 May 20, F.S.A.
Schwarziella—May 11, P.U.W.
Adela De Geerella—June 12, P.H.M.;
 A.S.G.
Micropteryx Subpurpurella—May 11,
 F.S.A.
Hyponomenta Plumbellus—July 23,
 P.H.M.
Plutella Craciferarum—June 30,
 P.H.M.
Cerostoma Radiatella—Sep. 25,
 P.H.M.
Cerostoma Vittella—July 28, P.H.M.
Costella—Sep. 25, P.H.M.
Xylostella—July 23, P.H.M.
Phibalocera Quercana—July 23,
 P.H.M.
Depressaria Subpropinquella—Oct.
 12, P.H.M.
Applana—May 26, W.G.G.S.
Gelechia Rufescens—July 13, P.H.M.
Harpella Geoffrella—June 12, A.S.G.
Dasycera Sulphurella—June 12.
Oecophosa Pseudopretella—June 5,
 P.H.M.
Endrosia Fenestrella—May 6, P.H.M.
Gracilaria Swederella—June 11,
 W.G.G.S.; F.S.A.
Laverna Ochruella—July 8, P.H.M.
Laverna Atra—July 8, P.H.M.

Asychna Terminella — larvae common in Sep., E.M.

Elachista Cygnipennella—June 19, A.S.G.

Lithocolletis Faginella—May 15, P.H.W.

PTEROPHORINA.

Pterophorus Acanthodactylus—July 18, P.H.M.

Trigonodactylus — May 18, W.F.B.

Phaeodactylus—July 23, P.H.M.

Fuscus—July 6.

Pterodactylus—Sep. 25, P.H.M.

Pentadactylus—June 25, B.W.B.

COLEOPTERA.

THE following is a list of the species taken during the past year. Those printed in italics were not noticed last year, and those marked with an asterisk have not been previously recorded. As more than half the number bear one or other of these marks, it shows how casual our record must be, unless this branch of our work is more steadily pursued by those who take an interest in it. If we could only make sure of getting each year notices of all the commoner species, we should not only double our list, but be on the way towards finding rarities. That such exist in Savernake Forest is certain.

Names of those whose initials occur :

A.E.A.	...	...	A. E. Aldworth.
R.A.	...	...	R. Alford, Esq.
F.S.A.	...	...	F. S. Alston
C.V.B.	...	...	C. V. Bankes
G.G.B.	...	...	G. G. Beale
P.S.B.	...	...	P. S. Bent
H.B.B.	...	...	H. B. Bird
W.F.B.	...	...	W. F. Blandford
F.H.B.	...	...	F. H. Bliss
E.K.C.	...	...	E. K. Chambers
C.E.C.	...	...	C. E. Cooper
F.E.D.	...	...	F. E. Drummond-Hay
O.E.	...	...	O. Elton
A.B.F.	...	...	A. B. Field
A.M.F.	...	...	A. M. Fairbairn
E.N.G.	...	...	E. N. Gardiner
H.G.G.	...	...	H. G. Goodacre
A.S.G.	...	...	A. S. Grove
J.F.L.H.	...	...	J. F. L. Hardy
T.N.H.S.	...	...	T. N. Hart-Smith, Esq.
A.L.J.	...	...	A. L. Jackson
P.H.M.	...	...	P. H. Maddock
G.T.K.M.	...	...	G. T. K. Maurice
A.M.	...	...	A. Meyrick-Jones
E.C.O.	...	...	E. C. Ouvry
Miss O.	...	...	Miss Ormerod
A.P.P.	...	...	A. P. Percival

Miss P. ...	...	Miss Preston
T.A.P. ...	...	Rev. T. A. Preston
R.W.B. ...	...	R. W. Rickards
A.J.S. ...	...	A. J. Shears
C.H.S. ...	...	C. H. Stileman
C.L.G.T. ...	...	C. L. G. Tuffnell
O.F.W. ...	...	O. F. Waterfield
J.S.W. ...	...	J. S. Wilson
H.W. ...	...	H. Woolner
F.W.Y. ...	...	F. W. Yeate

GEODEPHTHA.

Notiophilus biguttatus—Feb. 24,
F.S.A.

Carabus violaceus—Feb. 15, F.S.A.
nemorialis—March 4, H.G.G.

* *Catenulatus*—April 7, P.H.M.
Nebria brevicollis—March 17, H.G.G.
Loricera pilicornis—March 8, J.S.W.

Calathus piceus—March 5, W.F.B.
* *melanocephalus*—April 8, F.S.A.
Anchomenus parumpunctatus—Feb.
23, F.S.A.

* *dorsalis*—May 29, T.N.H.S.
Pterostichus madidus—March 20,
C.E.C.

oblongus—Feb. 24, W.F.B.
Amara trivialis—Moh. 29, C.E.C.

* *lunicollis*—Moh. 29, W.F.B.
familiaris—June 12, A.S.P.

Harpalus latus—Moh. 21, A.S.G.
rufoornis—June 5, Miss O.
aeneus—June 23, A.M.F.

* *Pterobus escaevatus*—Moh. 29, W.F.B.
Trochus minutus—Moh. 8, J.S.W.

obtusum—May 13, F.W.Y.
Bembidium lampros—June 30,
C.L.G.T.

littorale—Moh. 8, J.S.W.
guttula—Moh. 7, W.F.B.
obtusum—Moh. 8, H.G.G.

* *brunnipes*—Moh. 11, A.E.A.
biguttatum—May 13, W.F.B.
* *quadriguttatum*—May 13, F.S.A.
* *femoratum*—June 12, T.N.H.S.

HYDRADEPHTHA.

Hydroporus planus—

* *lituratus*—Feb. 29, F.S.A.
* *latus*

* *Agabus maculatus*—May 13, W.F.B.
* *nebulosus*—May 9, O.F.W.

Dytiscus marginalis—May 9, O.F.W.
Gyrinus natator—June 20, F.E.D.H.
Hydrobius fuscipes—June 12, F.S.A.
Helophorus aquaticus—May 29,
F.S.A.

BRACHETYTRA.

Aleochara fuscipes—May 15, A.E.A.
* *Homalota circellaris*—Moh. 10,
G.G.B. and G.T.K.M.

Tachyporus chrysomelinus—Feb. 24,
W.F.B.

* *humerosus*—Moh. 6, O.E.
hypnorum—Moh. 11, H.G.G.
obtusum—Moh. 8, H.G.G.

* *Tachirus laticollis*—Moh. 8, J.S.W.
rufipes—Moh. 20, W.F.B.

* *Jocysa picina*—Moh. 10, T.N.H.S.
Quedius fuliginosus—Feb. 24, W.F.B.

* *Mycetoporus splendidus*—Moh. 6, O.E.

Leistotrophus nebulosus—Moh. 26,
C.E.O.

Phileanthus varius—Feb. 24, F.S.A.

laminatus—,, W.F.B.

politus—,, W.F.B.

* *decorus*—Moh. 9, T.N.H.S.

* *trossulus*—May 15, T.N.H.S.

ceneus—Moh. 17, H.G.G.

Lithocharis brunnea—Moh. 6, O.E.

Poderus littoralis—Feb. 25, A.E.A.

Baptolinus alternans—Moh. 8, J.S.W.

* *Othius fulvipennis*—Moh. 5, W.F.B.

* *Lathrobium brunnipes*—Moh. 5,
W.F.B.

fulvipennis—Ap. 3, F.S.A.

* *Oreophilus maxillosus*—June 20,
A.B.F.

* *Staphylinus caesareus*—May 30,
F.W.Y.

* *Xantholinus longiventris*—Ap. 8,
F.S.A.

Stenus unicolor—Moh. 6, T.N.H.S.

latifrons—Moh. 4, J.S.W.

* *impressipennis*—Moh. 8, H.G.G.

Juno—Moh. 11, H.G.G.

Oxytelus rugosus—Moh. 6, O.E.

sculpturatus—Moh. 26, P.S.B.

* *Lesteva longalitrata*—May 9, O.F.W.

* *Proteinus brevicollis*—Ap. 5, P.S.B.

* *Anthobium sorbi*—June 8, T.N.H.S.

NECROPHAGA.

(CLAVICORNES).

Necrophorus mortuorum—May 15,
H.W.

humator—June 28, P.H.M.

Sipha atrata—Feb. 15, F.S.A.

rugosa—Moh. 25, W.F.B.

Hister cadaverinus—May 31, Miss P.

Brachypterus urticae—May 29, H.G.G.

Epuræa vestiva—May 15, T.N.H.S.

Nitidula bipustulata—May 12, F.S.A.

Meligethes rufipes—May 15, T.N.H.S.

ceneus—,, "

* *viridescens*—,, "

picipes—,, "

* *Byturus sambuci*—May 15, T.N.H.S.

timentosus—June 8, T.N.H.S.

Sphaeridium scarabaeoides—May 29,
F.S.A.

Dermestes murinus—May 12, W.F.B.

Byrrhus pilula—Feb. 23, F.S.A.

* *Cytillus varius*—Feb. 28, T.N.H.S.

LAMELLICORNES.

Sinodendron cylindricum—May 15,
A.M.

Aphodius depressus—Feb. 22, F.S.A.

Geotrupes stercorarius—Mar. 13,
F.H.B.

* *Typhaeus*—Feb. 29, P.H.M.

Melolontha vulgaris—May 20,
J.F.L.H.

Rhinotrogus soletitialis—June 26,
T.A.P.

STERNOXI.

* *Melanotus rufipes*—Ap. 7, P.H.M.

Athous haemorrhoidalis—Moh. 27,
W.F.B.

longicollis—June 27, A.P.P.

vittatus—June 12, T.N.H.S.

Agriotes pallidulus—June 13, F.S.A.

sobrinus—May 15, T.N.H.S.

Dasillus cervinus—June 27, H.G.G.

* *Helodes minuta*—May 29, T.N.H.S.

MALACODERMIDÆ.

Lampyrus noctiluca—Moh. 6, O.E.

* *Telephorus lituratus*—May 23, C.H.S.

limbatus—May 15, E.N.G.

nigricans—June 8, T.N.H.S.

bicolor—,, "

pallidus—,, "

pellucidus—June 20, E.N.G.

Malachius bipustulatus—June 23,
E.C.O.

Corynetes coerulescens—June 12, A.P.P.
HETEROMERA.

Blaps mcdonata—May 9, J.A.H.

Lagria hirta—June 11, C.H.S.

Pyrochroa serraticornis—May 26,
A.E.A.

Anaspis frontalis—May 15, T.N.H.S.
melanopa—June 8, T.N.H.S.

* *ruficollis*— " "

fasciata— " "

(RHYNCHOPHORA).

CURCULIONIDÆ.

Otiorhynchus tenebrioscus—Moh.
13, H.B.B.

* *fuscipes*—Ap. 7, H.G.G.

picipes—May 29, F.S.A.

Phyllobius pyri—June 8, T.N.H.S.

oblongus—May 15, T.N.H.S.

alneti—May 15, A.P.P.

argentatus—May 12, F.S.A.

Barynotus moerens—May 13, F.S.A.

Strophosimus coryli—Feb. 24, W.F.B.

Sitones tibialis—Ap. 3, F.S.A.

Polydrusus undatus—May 13, W.F.B.

Liosomus ovalulus—Feb. 23, T.N.H.S.

Hypera ruficis—Feb. 29, F.S.A.

Erihirminus maculatus—May 13, W.F.B.

Orchestes salicis—May 13, W.F.B.

fagi—May 13, F.J.S.

quercus—May 13, A.J.S.

Cionus serophularias—June 7, T.A.P.

hortulanus— " "

Ceuthorhynchus contractus—Moh. 6,
O.E.

Coeliodes quadrimaculatus—June 8,
T.N.H.S.

Apion miniatum—Moh. 12, H.G.G.

oethiops—May 15, T.N.H.S.

LONGICORNES.

Olytus arietis—June 24, C.V.B.

Grammoptera ruficornis—June 8,
T.N.H.S.

Toxotus meridianus—June 28, A.L.J.
and A.P.P.

EUPODA.

(PHYTOPHAGA.)

Lema agarella—June 8, T.N.H.S.

Crioceris asparagi—June 29, C.H.C.
and G.G.B.

Cryptocephalus aureolus—May 22,
A.E.A.

Timarcha laevigata—Moh. 21, A.S.G.

coriaria—Moh. 18, H.B.B.

Chrysomela polita—Moh. 7, W.F.B.

Phaedon cochlearias—June 7, R.A.

Prasocuris marginella—May 15,
T.N.H.S.

Adimonia sanguinea—Moh. 5, W.F.B.

Apteropeda graminis—Feb. 28,
T.N.H.S.

Orepidodera aurata—June 8, T.N.H.S.

Cassida viridis—Moh. 6, T.N.H.S.

Coccinella variabilis—Feb. 29, F.S.A.

16. *guttata*—Moh. 21, P.H.M.

22. *punctata*—May 13, E.K.O.

obliterata—May 15, A.E.A.

14. *punctata*—June 10, R.W.B.

DONATIONS 1880.

GEOLOGICAL.

Belemnite and Ammonite	J. S. Wilson.
Large Ammonite from Swindon Railway cutting...	Rev. the Master.
Fossils from Dudley Caves	L. J. Clarke.
Fossils	E. C. Ouvry.
Portion of tooth of <i>elephas primigenius</i> (Tertiary) ;	
Brancaaster Bay	G. F. Rodwell, Esq.
Ear bone of <i>Balaenopteron</i> (Tertiary), Norwich crag	,,
<i>Sigillaria oculata</i> (?) : coal measures : sandstone	
near Ballycastle	,,
<i>Astarte Borealis</i> (Tertiary), Norfolk crag	,,
Deposit on rocks near Seaton	A. H. Beesly, Esq.
Shell from chalk at Mildenhall... ..	Mr. Baverstock.
Ammonite from Swindon	,,
Ammonite from railway cutting	Mr. M. Guppy.
Basket of fossils from railway cutting	Rev. the Master.
Piece of vitrified fort from Burnt island—Kyles of	
Bute	H. Richardson, Esq.
Portion of <i>Iohthyosaurus</i> from Dunbar	E. M. Paul.
Shell from flint	G. T. K. Maurice.
Collection of fossil teeth	H. L. Callendar.

ORNITHOLOGICAL.

Egg of Chinese goose... ..	H. G. Goodacre.
79 eggs of Indian birds	H. C. Spry, Esq., O.M.
Cast of head of Dodo	H. G. Goodacre.
Double crested Grebe (mounted), from New	
Zealand	O. F. Waterfield.
Short eared Owl—shot on Rookley downs	H. Leaf, Esq.
Female Merlin (mounted)... ..	G. H. Dawson, Esq. O.M.

CONCHOLOGICAL.

Large collection of shells, chiefly from China seas	G. R. Askwith, Esq., O.M.
Long oyster shell, from Bermuda	Lieut. F. Carpenter, O.M.
Two Chitons	,,
Three finger Sponges	,,
One Sea Feather	,,
One piece of Brainstone Coral,,	,,
One Sea Rose	,,

Venus' flower-basket	Rev. T. A. Preston.
Complete collection of shells from Madeira	Miss Ormerod.

NUMISMATIC.

One quarter Farthing, 1851	G. A. H. C. Berkeley.
Several Coins	J. Z. M. Hamilton
Two Coins	E. N. Gardiner.
Old French Coin (rare)	L. E. Upcott, Esq.
Two Roman Coins from New Railway Cutting	Mrs. Cane, Junr.
Twelve Coins, chiefly South American	E. B. Badoock.
One Coin, Chinese	P. S. Bent.
Copper Farthing Ch. II. (rare)	H. C. Rendle.
Two Coins—Roman	A. J. C. Ross
One Coin—Indian	H. G. Goodacre
One Coin—Roman	A. E. Aldworth.
Russian Kopek	W. J. Ford, Esq.
Shilling, George III.	Mr. King.
Collection of Coins	Dr. Fergus.
Collection of Coins, chiefly Colonial	Rev. G. W. De Lisle.
Five Centimes, French Republic, 1872	E. M. Paul.
Five Coins—Chinese	B. T. N. Berkeley.
Two Coins—Buddhist... ..	D. M. Clark.
Eight Coins—Miscellaneous	Miss Preston.
Penny Token, Province of Nova Scotia, 1832	W. J. Ford, Esq.
Token, Devices	H. G. Goodacre.
Token, Gloucester Wagon Company	H. G. Goodacre.
Medal commemorative of capture of Porto Bello	R. B. de Chair.
Spanish Medal, Academy of Law, Carl iii. (1776)	Anon.
Medal commemorative of Siege of Seringapatam... ..	V. E. Barrow.
Two Sous piece Rep. Française, 1792, and two other Coins	J. Bell.

ARCHÆOLOGICAL.

Pottery from Oxford Clay	J. S. Wilson.
Key found in St. John's Church, Devices	Mr. O. Hyatt.
Jawbone from Martinsell	J. S. Wilson.
Clay Pipe dug up in Southwark	H. Richardson, Esq.
Bones, &c., from Frilford	J. S. Wilson.
Part of Beam from C. House, which took fire May, 1880... ..	Rev. T. A. Preston.
Four tesserae from Silchester	E. N. Gardiner.

Small Clay Pipe dug up in Ireland W. H. Rotheram.
 Mill Stone of Sarsen Stone, from Fyfield Downs,, Mr. S. H. Neate.

ENTOMOLOGICAL.

One dozen Beet es G. R. Askwith, Esq., O.M.
 Four Beetles H. A. Harley, Esq., O.M.
 A Collection of 500 Marlborough Beetles E. Meyrick, Esq., O.M.

LIBRARY.

Henfrey's Guide to English Coins Rev. T. A. Preston.
 Catalogue de la Collection de Medailles du
 Chevalier Horte H. B. Creeke.
 St ay Leaves of a Traveller in Search of Coins ... H. B. Creeke.
 Lessons in Elementary Anatomy (Mivart) F. E. Hulme, Esq.
 Elementary Hand-book of Physics (Rossiter) ... F. E. Hulme, Esq.
 Cobham Journals Miss Ormerod.

BOTANICAL.

Portion of Branch of Wellingtonia H. M. Elder.
 Seed Pod of Indian Tree G. G. L. Hadow.

ZOOLOGICAL.

Skull of Dugong, embryo skeleton, and ribs ... J E. Hammick, Esq., O.M.

MISCELLANEOUS.

Invitation to last Quaker Meeting held in Marl-
 borough Mr. Neate.
 Phylloxera Supplement to "Cape Times" W. E. Mullins, Esq.
 Collection of paintings on talc of Cingalese types H. C. Berwick.
 Pair of Indian Peacock Fly Fans G. G. L. Hadow.
 Cloth from Bark of Mulberry Tree from Fiji
 Islands O. F. Waterfield.
 Indian Purse W. H. Rotheram.
 Cap from Himalayas W. H. Rotheram.
 Photograph of Chedzoy Church H. P. Mullens.
 Three Photographs of Giant's Causeway, Ireland J.Topham Richardson, Esq.
 One ditto ditto H. Richardson, Esq.
 Two Photographs of Dorset Coast A. G. Palgrave.

PUBLICATIONS ISSUED BY THE SOCIETY.

	<i>s.</i>	<i>d.</i>
The Antiquities of Marlborough College, a Lecture delivered by		
Bishop Cotton, 1855... ..	0	6
A Catalogue of the Museum collections by the Rev. T. A. Preston,		
and F. E. Hulme, Esq.,—1880... ..	1	0
A Map of the district, Facsimile of Ordnance Survey—1 inch to mile	0	6
Measurement Card	0	6

PUBLICATIONS TAKEN IN BY THE SOCIETY.

Land and Water.
 The Zoologist.
 The Geological Magazine.
 Science Gossip.
 Nature.
 Wiltshire Archæological Magazine.
 The Entomologist.
 Quarterly Journal of Meteorological Society.
 Entomologist's Monthly Magazine.

SOCIETIES WITH WHOM REPORTS ARE EXCHANGED.

Clifton College Scientific Society.
 Watford Natural History Society.
 Bristol Natural History Society.
 Rugby Natural History Society.
 New Zealand Institute.
 North American Land Survey.

SUBJECTS FOR THE STANTON PRIZE.

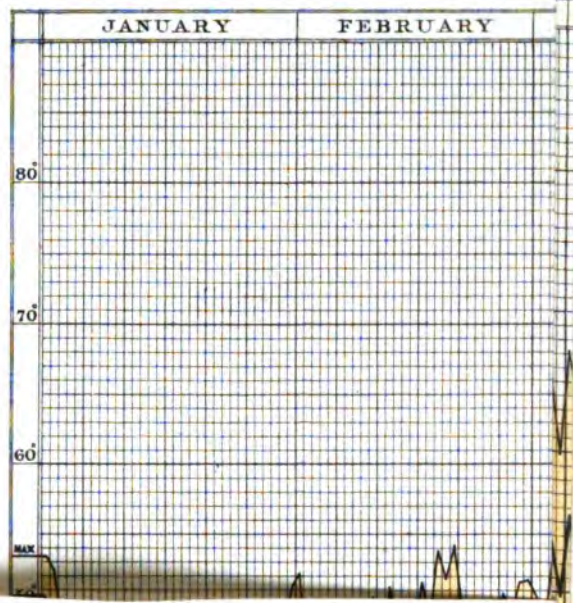
EXAMINATION IN OCTOBER, 1881.

Botany.

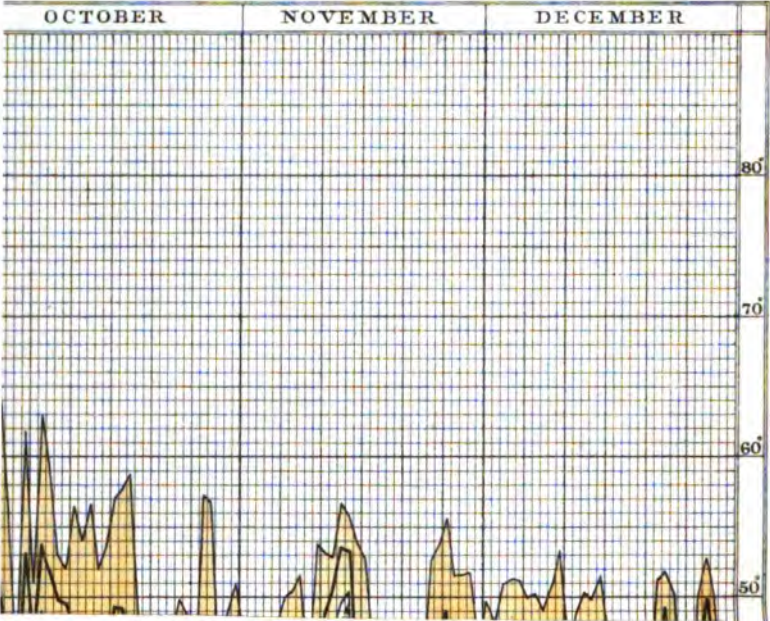
- (1). A collection of Marlborough Plants of *only* the following :
 Ranunculaceæ.
 Caryophyllaceæ.
 Leguminosæ.
 Umbelliferæ.
 Compositæ.
 Labiatæ.
 Liliacæ.
 Orchidacææ.
- (2). A dissection of a Typical Species of each order.
- (3). The Examination will be on the above Orders. Books recommended, Oliver's Botany and Lindley's School Botany. Specially to be attended to.

Entomology.

- (1). A collection of Marlborough Butterflies and Moths—not less than 200 species.
 A Male and Female of each species, and of Butterflies a third specimen, showing the under side.
- (2). Drawings of the nerves of the wings of 20 genera.
- (3). The Examination will be in connection with the collections recommended, Dallas' Elements of Entomology, especially relating to Lepidoptera.



DR 1880.



JANUARY, 1880.

Date.	Mean Readg of Baromtr. reduced to Sea Level.	Temperature.						Wind.			Mean. amt. of Cloud (0.10).	Rain.
		In the Shade.				Highest insun's rays.	Lowest on the grass.	Direction.		Velocity Miles.		
		High- est.	Lowest	Adop- ted. Mean.	Dew Point.			A.M.	P.M.			
1	ins. 30.007	53.5	49.0	50.6	47.8	60.4	43.7	S.W.	S.W.		9.0	in. -05
2	.201	52.5	40.2	44.5	39.7	69.8	32.3	W.	S.W.		4.5	
3	.486	48.6	36.7	40.7	37.7	82.2	25.8	S.W.	W.		3.5	
4	.479	44.9	33.6	38.1	35.9	84.0	23.9	W.	W.		10.0	-01
5	.502	43.7	36.8	39.3	36.2	67.0	34.8	S.	W.		9.5	
6	.691	38.7	32.6	34.8	33.6	40.0	33.2	S.W.	W.		10.0	
7	.658	37.0	32.0	34.4	33.9	40.3	32.7	E.	S.E.		10.0	-01
8	.586	37.9	28.6	31.3	27.7	35.5	30.0	E.	E.		10.0	
9	.554	31.0	28.2	29.5	27.4	33.8	28.7	E.	E.		10.0	
10	.558	37.3	29.0	33.7	31.3	40.6	29.2	E.	E.		9.5	
11	.565	37.9	31.6	33.9	28.0	42.6	30.4	E.	E.		10.0	
12	.585	33.8	30.2	31.3	27.6	36.5	25.0	E.	E.		10.0	
13	.468	33.0	29.2	30.6	28.9	41.0	28.9	E.	N.		10.0	-20
14	.390	35.3	28.2	31.3	28.7	50.3	25.6	N.W.	N.W.		9.5	
15	.297	36.8	16.7	27.2	24.6	70.3	10.9	W.	W.		10.0	-05
16	.042	38.6	31.8	35.4	34.6	46.3	28.0	S.W.	W.		9.5	-16
17	.060	39.9	27.2	31.9	28.4	40.6	17.8	N.E.	N.E.		10.0	
18	.067	40.6	21.2	27.4	23.2	72.3	23.1	N.	N.		8.5	
19	.485	33.4	20.5	25.1	16.0	58.7	17.8	N.E.	N.E.		0.5	
20	.671	34.7	14.7	21.0	14.7	67.0	13.2	E.	E.		8.5	
21	.644	39.7	15.4	23.4	18.4	62.5	14.8	N.	N.		0.0	
22	.438	36.9	17.8	27.4	26.0	69.0	16.6	N.W.	N.W.		1.5	-01
23	.513	36.1	29.3	32.6	31.2	44.9	27.5	N.	N.		10.0	
24	.393	35.2	30.4	32.2	22.7	36.0		E.	W.		10.0	
25	.179	32.5	25.1	27.9	22.5	40.2	15.5	W.	E.		5.0	
26	.336	31.7	18.5	22.3	19.6	77.0	8.8	N.	N.		5.0	
27	.361	32.3	16.3	23.8	23.3	43.2	8.8	N.	E.		10.0	
28	.256	28.0	8.6	18.7	18.7	37.8	6.5	N.	N.		5.0	
29	.173	33.0	23.1	27.8	27.0	41.4	23.7	N.	S.		5.0	
30	.226	47.8	29.8	37.7	35.5	32.3	21.0	S.E.	S.		5.0	-02
31	30.375	51.4	34.2	39.3	34.8	33.3	21.4	S.	S.		0.5	
Max.	30.392	38.5	27.3	31.8	28.6	55.1	23.3	...	...	...	7.1	-51

FEBRUARY, 1880.

Date.	Mean Readg of Baromtr. reduced to Sea Level.	Temperature.						Wind.		Velocity. Miles.	Mean amt of Cloud (0-10)	Rain.
		In the Shade.					Lowst on the grass.	Direction.				
		High. est.	Low- est.	Adop- ted Mean.	Dew Point.	Highst insun's rays.		A.M.	P.M.			
1	in. 30.361	52.4	27.3	36.8	31.0	94.1	19.6	S.E.	S.		0.0	in. .01
2	.369	42.0	32.3	37.5	37.5	52.2	20.9	S.	S.		10.0	.01
3	.439	41.9	38.5	39.8	39.1	47.0	36.3	S.	S.		10.0	.07
4	.362	48.9	32.3	38.2	35.8	89.9	27.7	S.	S.W.		10.0	.01
5	30.073	45.8	30.1	38.1	37.7	67.9	29.9	S.W.	S.W.		10.0	.10
6	29.808	46.4	41.3	43.3	41.9	58.2	35.9	S.	S.W.		10.0	.13
7	.536	48.6	43.0	46.5	45.2	54.0	40.5	S.W.	S.W.		10.0	.27
8	.578	48.8	84.0	39.1	35.4	97.6	23.3	W.	S.W.		4.0	.13
9	.225	45.7	34.0	40.8	38.0	55.5	24.3	S.	W.		9.5	.20
10	.516	50.5	35.0	39.5	34.0	97.7	27.0	E.	N.E.		4.5	
11	.823	44.8	31.7	36.5	33.0	65.2	21.8	N.E.	N.E.		4.5	.10
12	29.905	51.2	32.4	40.8	37.4	100.2	21.4	W.	S.E.		3.0	.07
13	30.180	47.7	30.5	37.7	34.2	94.3	21.3	S.E.	S.		4.5	.23
14	29.820	45.1	38.3	41.6	40.2	48.9	33.9	S.	S.E.		5.0	.10
15	29.577	45.8	38.9	42.5	40.7	62.2	30.8	S.E.	S.E.		10.0	.41
16	28.994	51.7	43.4	46.3	2.0	60.0	40.7	S.E.	S.		10.0	.72
17	29.187	48.7	34.3	41.4	37.5	97.9	33.7	S.W.	S.W.		7.0	.04
18	.304	53.9	43.2	47.7	45.2	97.5	39.6	S.W.	S.W.		9.5	.41
19	.275	51.9	46.6	48.6	45.0	81.0	42.5	S.W.	S.		7.5	.20
20	.468	54.2	44.9	48.2	44.1	105.0	40.3	S.W.	S.W.		9.5	.26
21	.802	49.9	37.2	42.0	38.5	92.9	30.8	S.W.	W.		4.5	.15
22	29.840	47.8	30.5	37.9	36.0	99.0	24.9	S.W.	W.		10.0	.06
23	30.085	40.9	32.0	35.9	34.3	53.0	25.6	N.	N.		10.0	.01
24	.367	39.2	35.3	36.9	33.2	48.8	34.5	N.	N.W.		10.0	
25	30.405	48.9	28.3	37.4	31.8	98.2	20.1	W.	W.		5.5	.01
26	29.983	50.8	37.0	42.2	37.1	101.8	29.2	W.	W.		8.5	.02
27	.358	49.1	32.5	40.5	36.0	98.0	26.7	W.	W.		7.5	.01
28	.622	51.5	40.4	45.1	41.5	98.9	36.7	W.	W.		4.5	
29	29.652	51.7	41.2	46.1	43.3	90.2	33.3	S.W.	S.W.		10.0	.03
Mns	29.806	49.1	36.1	41.2	38.2	79.6	30.1	...	...	...	7.6	Sum 3.76

MARCH, 1880.

Date.	Mean Readg of Baromtr. reduced to Sea Level.	Temperature.						Wind.			Mean amt. of Cloud (0-10).	Rain. in.
		In the Shade.				Highest insun's rays.	Lowest on 'the grass.	Direction.		Velocity. Miles.		
		High- est.	Low- est.	Adop- ted. Mean.	Dew Point.			A.M.	P.M.			
1	ins. 29.442	50.6	34.3	41.8	35.5	95.0	31.7	W.	W.		0.5	in. .27
2	.369	48.7	33.5	44.2	42.9	63.1	30.7	S.W.	W.		10.0	.71
3	.400	53.7	46.4	49.2	43.7	93.0	44.9	W.	W.		9.5	.07
4	29.914	53.6	43.4	48.2	44.1	97.0	38.5	W.	W.		6.0	.01
5	30.124	55.7	48.1	50.9	47.5	99.4	43.0	W.	W.		10.0	
6	.127	52.9	46.4	48.4	41.7	76.4	42.7	S.W.	W.		10.0	.01
7	.208	53.5	46.2	49.0	45.2	74.8	44.7	S.W.	N.		9.5	.04
8	.467	49.6	40.2	43.1	37.9	101.9	38.2	N.E.	N.		8.5	
9	.259	54.9	38.0	45.2	42.3	94.0	38.9	E.	S.E.		9.5	.26
10	.256	55.1	40.7	44.8	40.1	104.1	29.6	W.	W.		5.0	
11	.409	58.7	33.4	44.6	40.7	100.8	25.5	E.	E.		4.5	
12	.337	59.6	39.1	47.4	43.2	100.6	25.7	E.	N.W.		10.0	
13	.355	56.8	36.3	44.5	39.4	110.2	23.8	N.W.	N.W.		5.0	
14	.275	55.0	34.4	43.8	39.8	113.7	25.7	E.	E.		8.0	
15	.237	49.7	37.5	41.7	37.5	97.4	30.8	E.	E.		5.0	
16	.082	50.7	36.3	41.1	35.5	105.8	29.6	E.	E.		9.5	
17	.164	51.6	36.0	41.7	34.7	93.2	29.9	E.	E.		4.0	
18	.337	54.5	33.3	42.5	31.8	105.6	24.3	E.	E.		0.0	
19	.346	55.0	33.7	42.4	34.4	105.1	25.6	E.	E.		4.5	
20	.292	52.6	27.3	37.6	33.2	106.7	18.5	E.	E.		10.0	
21	.299	49.1	36.0	40.7	33.1	99.8	24.2	E.	E.		0.5	
22	.358	45.2	30.2	36.7	30.6	104.2	20.6	E.	E.		5.0	
23	.352	47.8	32.8	38.3	31.5	105.7	24.4	E.	E.		4.5	
24	.246	57.7	28.5	41.9	32.2	108.8	18.4	E.	E.		0.5	
25	.090	61.7	33.3	46.5	34.7	107.5	27.7	E.	E.		1.0	
26	.057	61.9	36.8	48.5	34.6	103.9	28.9	E.	E.		5.5	
27	.183	48.5	32.0	38.3	33.1	97.6	25.6	E.	E.		5.5	
28	.199	50.7	32.2	37.5	29.6	112.9	21.3	E.	N.		5.0	
29	30.061	60.9	24.6	44.0	36.7	115.6	16.5	N.	N.		0.0	
30	29.958	63.5	32.5	46.2	36.8	117.1	22.7	N.	W.		4.5	
31	29.468	49.5	37.7	44.0	40.2	66.8	23.8	S.	S.		10.0	.47
Mns.	30.118	53.8	36.2	43.7	37.6	99.2	29.7	...	...		5.8	Sum 1.84

APRIL, 1880.

Date.	Mean Readg. of Baromtr. reduced to sea Level.	Temperature.						Wind.		Velocity. Miles.	Mean amt. of Cloud (0-10)	Rain.
		In the Shade.				Highest insun's rays.	Lowst. on the grass.	Direction.				
		High- est.	Lowest	Adop- ted Mean.	Dew Point.			A.M.	P.M.			
1	ins. 29.688	52.7	38.2	44.8	38.2	113.4	31.4	W.	S.W.		5.5	in. .30
2	.524	57.0	39.3	47.1	43.9	95.7	31.7	S.W.	W.		9.5	.10
3	.572	59.7	47.4	52.2	47.5	120.6	45.0	S.W.	S.W.		9.5	.14
4	.391	53.5	42.2	47.0	43.1	109.5	57.1	S.W.	S.W.		5.0	.08
5	.418	52.0	38.5	44.0	37.4	111.2	32.4	S.W.	S.W.		5.0	.11
6	.370	56.6	36.8	44.4	38.7	116.6	29.1	W.	S.W.		4.5	.14
7	29.572	56.4	36.5	45.9	38.5	120.7	30.0	S.W.	W.		1.0	.05
8	30.013	52.7	35.3	42.4	38.9	104.3	27.6	N.	N.E.		5.0	.08
9	.302	46.3	39.2	41.7	36.2	71.5	31.8	N.E.	N.E.		9.5	.01
10	30.184	45.8	36.8	40.6	35.1	78.7	32.8	N.E.	E.		10.0	
11	29.985	45.8	35.6	40.5	35.8	91.2	34.7	E.	E.		9.5	
12	.909	50.7	37.1	42.0	37.4	114.7	29.6	N.E.	N.E.		5.0	.01
13	.913	55.8	36.4	45.2	42.0	127.1	27.8	N.E.	N.E.		10.0	.36
14	.722	46.1	43.0	44.4	42.8	55.3	42.3	N.E.	E.		10.0	.50
15	.675	47.7	39.3	42.3	38.9	57.2	28.6	E.	S.E.		5.0	.21
16	.794	53.9	38.3	45.9	40.9	112.7	30.3	S.W.	W.		5.0	.07
17	.877	59.4	37.1	48.6	43.0	120.9	26.7	S.	S.		5.0	.01
18	.998	55.8	38.2	49.1	45.1	101.7	29.8	S.	S.		9.0	
19	.878	62.2	48.4	53.7	45.1	118.7	41.2	S.	S.		8.0	.23
20	.947	61.0	44.5	50.2	43.3	127.9	33.1	S.W.	S.W.		4.0	
21	.985	54.9	41.7	48.5	42.2	99.7	36.4	S.W.	S.W.		9.5	.03
22	29.889	56.0	42.2	47.6	41.3	121.4	36.3	S.W.	W.		4.0	.07
23	30.129	60.7	34.3	48.2	41.0	121.7	25.4	N.W.	W.		0.5	
24	.054	57.6	41.7	49.5	44.9	116.5	33.1	W.	W.		10.0	
25	.015	57.5	43.0	49.2	37.8	124.7	35.0	N.E.	N.		4.5	
26	.112	49.8	35.2	42.3	35.6	107.0	27.7	N.E.	N.W.		3.5	.04
27	.220	48.8	31.2	40.9	33.7	101.5	24.9	N.E.	N.E.		4.5	
28	.142	49.6	37.7	43.5	35.8	64.1	31.2	N.E.	N.E.		8.5	
29	.344	51.9	38.1	43.1	33.5	112.6	30.5	N.E.	N.		5.0	
30	30.410	55.9	34.2	45.1	33.5	115.6	27.5	N.E.	N.W.		1.0	
Mean	29.899	53.8	38.9	45.7	39.7	105.1	32.4	...	...		6.2	Sum 2.54

MAY, 1890.

Date.	Mean Readg of Baromtr. reduced to Sea Level.	Temperature.						Wind.			Mean amt of Cloud (0-10)	Rain.
		In the Shade.				Highest insun's rays.	Lowst on the grass.	Direction.		Velocity. Miles.		
		High- est.	Low- est.	Adop- t-d Mean.	Dew Point.			A.M.	P.M.			
	in.											in.
1	30.168	61.7	29.3	47.6	37.7	117.7	21.9	N.	N.W.		0.0	
2	29.863	63.5	33.3	49.1	41.2	122.7	25.7	E.	N.		1.0	
3	29.757	56.9	37.5	47.2	43.0	109.7	28.7	N.	N.		3.5	.01
4	30.012	55.9	42.9	48.3	41.0	106.4	36.0	N.E.	N.		10.0	
5	.075	56.3	44.0	48.5	39.5	115.2	38.4	N.	N.		3.5	
6	.057	59.9	41.7	48.9	39.0	119.3	32.2	N.	N.E.		10.0	
7	.148	55.9	39.1	46.1	32.9	127.1	30.3	N.E.	N.		5.5	
8	.167	57.5	41.1	49.2	35.7	117.8	37.9	E.	N.		3.5	
9	.311	54.9	34.5	45.0	35.4	122.0	25.9	N.E.	N.		9.0	
10	30.097	48.7	33.0	43.3	33.9	81.0	24.8	N.	N.E.		10.0	.07
11	29.958	55.5	42.4	47.1	40.6	113.7	38.2	E.	N.		6.0	
12	30.038	58.7	39.1	48.3	40.5	121.7	33.2	E.	N.E.		4.5	
13	.174	63.5	39.3	50.9	43.1	120.6	34.5	N.E.	N.E.		0.5	
14	.138	70.7	42.1	54.4	48.7	121.2	33.8	N.E.	N.E.		6.5	
15	.132	65.7	48.7	55.0	46.1	122.2	44.7	N.E.	N.E.		5.0	
16	.176	63.5	43.2	51.3	10.0	118.7	38.3	N.E.	N.E.		0.5	
17	.262	59.7	39.3	46.1	37.7	120.7	33.9	N.E.	N.E.		2.5	
18	.305	59.1	37.7	48.1	36.0	121.7	29.5	N.E.	N.E.		3.5	
19	.224	61.4	35.3	50.3	42.5	101.9	28.1	W.	N.		5.0	
20	.264	73.5	49.2	61.4	48.2	125.9	39.2	N.	N.		0.5	
21	30.200	74.9	47.1	60.6	50.5	130.2	38.0	W.	W.		5.5	
22	29.910	60.3	47.8	52.5	49.2	105.9	40.9	W.	W.		5.5	
23	.937	61.1	41.8	52.6	45.0	104.7	35.7	S.W.	S.W.		8.0	
24	29.951	64.6	48.6	56.0	48.0	124.5	40.9	S.W.	W.		5.0	.02
25	30.054	70.7	50.1	57.9	48.2	126.8	41.6	S.W.	S.W.		5.5	
26	29.916	71.3	49.1	61.5	53.1	125.7	39.8	S.W.	W.		9.5	.02
27	29.910	60.4	46.7	52.8	48.8	95.4	35.6	S.W.	N.		5.5	.21
28	30.330	61.2	39.1	50.4	41.2	129.6	29.3	W.	W.		3.0	.02
29	.483	61.9	37.4	51.0	40.6	126.8	27.9	N.W.	N.W.		3.0	
30	.363	66.0	35.0	53.1	40.3	130.0	25.8	S.W.	S.W.		6.0	
31	30.128	52.0	45.7	48.2	42.2	70.0	42.3	S.E.	E.		9.0	.20
Mean	30.112	61.6	41.4	51.1	42.4	116.1	34.1	...	...	...	5.2	Sum 0.55

JUNE, 1890.

Date.	Mean Readg of Baromtr. reduced to Sea Level.	Temperature.						Wind.		Velocity. Miles.	Mean amt. of Cloud (0-10).	Rain.
		In the Shade.				Highest insun's rays.	Lowst. on the grass.	Direction.				
		High- est.	Low- est.	Adop- ted. Mean.	Dew Point.			A.M.	P.M.			
	ins.											in.
1	30-117	60.7	43.2	52.0	46.8	123.2	36.8	N.E.	N.E.		6.5	.17
2	30-067	54.0	47.3	51.1	48.5	73.0	44.2	N.E.	N.		10.0	.61
3	29-944	53.5	47.7	50.4	47.7	69.8	47.6	N.E.	N.E.		10.0	.04
4	29-933	56.9	46.2	49.4	42.1	114.0	40.3	N.E.	N.		9.0	
5	30-055	61.3	41.4	51.9	44.0	126.3	33.7	N.W.	N.W.		6.5	.09
6	29-938	68.7	49.3	54.6	49.1	115.4	48.2	N.W.	W.		9.0	.05
7	.744	62.8	48.2	53.1	47.2	122.8	44.6	S.W.	W.		6.0	
8	.786	59.7	44.3	51.3	43.5	117.5	36.4	S.W.	W.		6.0	.06
9	.797	55.6	40.2	49.6	44.1	102.9	30.4	S.W.	S.		6.0	.04
10	.857	61.9	36.2	50.5	45.9	126.8	30.0	N.E.	W.		6.5	.05
11	29-948	65.7	40.1	52.2	47.0	125.6	32.6	N.E.	W.		5.5	
12	30-024	70.7	38.6	56.2	49.4	126.3	31.4	S.W.	W.		1.0	
13	.035	69.0	45.1	57.0	49.3	129.9	35.7	S.	S.		7.0	
14	.110	67.4	49.0	58.3	53.0	121.5	43.8	N.	N.		9.5	.02
15	.100	61.2	51.7	55.9	49.4	92.2	46.4	N.W.	N.		9.5	.08
16	.020	58.8	50.8	55.0	51.1	71.3	50.3	N.E.	N.E.		10.0	.20
17	30-134	66.1	34.2	59.7	56.5	115.9	52.1	N.E.	E.		10.0	.34
18	29-930	73.6	53.3	62.8	54.4	130.1	49.6	N.E.	N.		6.5	.06
19	.691	65.6	54.0	59.3	54.5	124.7	50.4	E.	S.E.		9.5	.18
20	.597	65.7	55.9	59.7	51.6	118.1	53.7	S.E.	S.W.		9.5	
21	.678	65.7	51.8	57.7	51.0	131.4	47.8	S.E.	W.		5.5	.05
22	.787	67.0	44.6	56.5	54.3	121.9	40.0	W.	W.		9.5	.02
23	.773	68.7	51.3	59.2	53.0	135.8	45.5	W.	W.		9.5	
24	.809	71.3	53.6	60.5	51.8	132.2	45.6	W.	W.		5.5	.01
25	.844	70.0	50.0	59.7	51.3	123.0	42.9	S.W.	W.		7.0	
26	29-981	69.1	47.0	58.7	54.3	124.0	38.2	W.	W.		7.0	.14
27	30-231	72.0	48.1	61.6	54.2	128.9	39.0	S.W.	S.W.		7.5	
28	.244	70.7	56.0	61.5	53.0	126.7	53.2	W.	W.		9.0	
29	30-089	71.1	55.3	61.0	54.5	126.4	47.2	W.	W.		9.0	
30	29-798	74.0	50.7	61.8	54.4	133.5	42.4	S.W.	S.W.		8.5	.12
Mns.	29-935	65.2	48.2	56.3	50.4	117.7	42.6	...	...		7.7	Sum 1.73

JULY, 1880.

Date.	Mean Readg. of Baromtr. reduced to sea Level.	Temperature.						Wind.			Mean amt. of Cloud (0-10)	Rain.
		In the Shade.				Highest insun's rays.	Lowest on the grass.	Direction.		Velocity. Miles.		
		High- est.	Lowest	Adop- ted Mean.	Dew Point.			A.M.	P.M.			
1	ins. 29-785	65.9	52.7	58.5	52.7	113.3	46.8	S.W.	W.		6.0	in. .08
2	.782	63.9	47.8	57.3	53.3	107.7	39.2	S.W.	S.W.		10.0	.11
3	29-706	64.3	54.1	57.6	52.5	126.8	48.4	S.W.	W.		9.0	.19
4	30-043	67.3	50.2	57.5	49.0	126.1	41.6	N.W.	N.W.		4.5	
5	.193	71.7	43.7	58.8	49.7	129.7	35.8	N.W.	W.		3.5	
6	30-013	63.8	52.0	57.7	53.0	112.3	46.6	W.	S.W.		9.0	.20
7	29-685	66.7	50.7	56.5	51.7	117.7	43.9	S.W.	S.W.		5.5	.08
8	.676	64.7	49.0	57.1	51.3	125.9	41.6	S.W.	S.W.		8.5	.20
9	.781	64.5	49.3	56.5	50.9	117.6	45.0	S.W.	S.W.		5.0	.08
10	29-949	68.7	48.4	58.4	52.4	127.8	41.0	S.W.	S.W.		9.0	.02
11	30-133	70.7	53.9	60.7	52.3	138.0	43.6	W.	S.W.		9.5	
12	.172	65.9	48.1	58.4	52.1	117.0	39.5	S.W.	S.W.		9.0	.16
13	.120	67.1	54.1	59.5	55.9	121.8	52.5	S.	S.		8.0	.66
14	30-047	69.6	55.4	59.8	55.2	129.1	52.1	S.	E.		7.0	.06
15	29-957	76.3	56.1	63.7	56.8	133.6	50.0	E.	N.W.		5.5	
16	30-.91	74.7	47.0	61.6	49.1	136.6	40.7	N.E.	N.E.		8.5	
17	30-038	72.2	59.6	64.0	57.7	96.9	53.9	N.E.	W.		9.5	.04
18	29.964	72.2	55.8	63.3	54.3	130.3	49.2	S.W.	S.W.		6.0	.06
19	30-038	71.7	53.8	61.9	55.4	132.7	43.2	S.W.	W.		5.5	
20	.115	72.7	50.3	61.0	54.7	132.4	41.7	S.W.	W.		4.5	
21	30.052	74.1	51.6	62.7	56.5	134.4	44.5	S.	S.		9.5	.49
22	29.999	73.3	50.3	61.4	57.6	126.1	45.0	E.	W.		6.5	
23	.981	72.8	49.5	62.2	54.8	124.6	43.1	S.	W.		5.0	
24	.897	71.1	55.3	62.0	56.0	134.8	51.0	S.W.	W.		9.5	
25	.887	73.7	47.2	62.1	54.4	137.2	42.2	S.	S.		8.5	.49
26	.555	68.3	55.5	62.0	59.9	120.4	55.0	S.	S.		9.5	.48
27	.813	71.0	57.2	63.5	55.0	132.7	53.3	W.	S.		7.5	.06
28	.692	65.2	57.5	61.0	57.2	98.7	57.8	S.W.	S.W.		10.0	.34
29	.805	68.1	55.0	59.7	55.0	126.9	53.0	S.W.	W.		6.0	.22
30	.679	69.2	51.8	58.1	51.2	139.5	45.1	W.	S.W.		3.0	.07
31	29.794	67.2	46.6	57.2	47.5	123.6	42.8	W.	W.		4.0	.18
Mns	29-909	69.3	51.9	60.1	54.0	125.1	46.6	...	...		7.2	Sum 4.87

AUGUST, 1880.

Date.	Mean Readg of Baromtr. reduced to Sea Level.	Temperature.						Wind.			Mean. amt. of Cloud (0-10).	Rain.	
		In the Shade.				Highest insun's rays.	Lowst. on the grass.	Direction.		Velocity Miles.			
		High- est.	Lowest	Adop- ted. Mean.	Dew Point.			A.M.	P.M.				
	ins.												in.
1	29.665	61.6	49.3	54.9	50.3	127.7	50.0	N.E.	W.		6.0		.18
2	.744	66.6	51.8	56.9	50.7	124.1	45.5	N.W.	N.W.		5.5		.01
3	.932	69.5	47.9	60.0	53.7	130.6	44.4	N.W.	W.		6.5		
4	.923	71.3	57.1	63.0	57.1	135.9	56.3	W.	W.		9.0		
5	.810	74.4	56.6	63.6	58.0	123.1	57.6	S.	S.		6.5		.41
6	.653	68.5	55.0	59.7	55.0	108.0	51.3	W.	W.		6.0		.11
7	.458	62.0	52.5	57.1	53.0	93.9	47.3	S.W.	W.		10.0		.19
8	29.767	66.5	51.6	57.5	50.8	129.9	47.1	W.	N.W.		2.5		
9	30.112	74.7	48.8	60.8	52.8	134.9	44.6	N.W.	N.W.		1.0		
10	.304	77.7	46.5	64.3	58.0	131.6	44.6	W.	W.		5.0		
11	.260	77.3	59.3	66.8	60.2	133.4	56.0	N.	N.		4.0		
12	.218	71.9	55.7	62.4	54.5	133.1	50.7	N.E.	N.		4.5		
13	.144	74.8	56.1	64.5	58.0	128.6	50.7	N.	N.E.		4.0		
14	.133	75.0	58.0	64.7	58.2	130.6	53.6	N.E.	N.E.		9.0		
15	.128	66.7	57.9	61.2	57.6	102.9	57.8	N.E.	N.E.		10.0		
16	.107	65.0	54.9	59.0	55.4	88.0	54.3	N.E.	N.E.		10.0		
17	.143	71.2	67.3	61.9	56.5	125.2	56.7	N.E.	E.		10.0		
18	.136	69.3	56.1	60.7	53.5	132.6	56.0	N.E.	E.		10.0		
19	.078	68.2	55.1	60.3	56.0	118.9	55.0	E.	N.		10.0		
20	.057	69.2	58.2	61.5	57.1	128.6	53.5	N.F.	N.		9.5		
21	.107	69.7	57.3	61.2	54.8	122.2	54.0	N.E.	N.E.		6.0		
22	.079	70.7	55.1	60.7	52.1	129.6	49.8	N.E.	N.E.		4.5		
23	.056	64.7	50.9	58.3	53.5	111.7	45.1	N.E.	N.F.		7.5		
24	30.058	67.7	50.1	58.2	52.9	122.1	46.3	N.E.	N.E.		10.0		.02
25	29.996	65.4	53.9	59.7	57.4	84.7	49.2	N.E.	E.		10.0		
26	29.957	75.7	57.7	63.6	59.2	127.4	54.2	E.	N.		6.5		.23
27	30.167	75.0	55.8	63.4	60.0	121.9	49.3	N.E.	N.E.		5.5		
28	.223	76.7	54.8	63.4	57.3	125.0	43.8	N.E.	N.E.		5.0		.13
29	30.046	73.5	55.9	63.0	54.8	133.6	48.8	E.	E.		3.5		
30	29.998	76.0	54.7	62.6	56.5	127.9	45.7	E.	E.		4.5		
31	30.106	76.7	48.0	59.8	56.3	127.4	39.1	N.E.	N.		5.0		
Mns.	30.018	70.8	54.1	61.1	55.5	122.4	50.4	...	...	...	6.7		1.35

SEPTEMBER 1880.

Date.	Mean Readg of Baromtr. reduced to Sea Level.	Temperature.						Wind.			Mean amt of Cloud (0-10)	Rain.
		In the Shade.						Direction	Velocity. Miles.			
		High- est.	Low- est.	Adop- t d Mean.	Dew Point.	Highest insun's rays.	Lowst on the grass.			A. M.		
1	in. 30-299	75.9	48.9	60.8	56.8	126.9	°	S. W.	W.		5.5	in.
2	348	79.9	59.1	67.1	60.6	135.6		W.	N.		3.5	
3	30-218	82.0	52.7	66.3	55.3	131.0		S.	S.		0.0	
4	29.998	84.5	55.0	68.9	62.2	132.1		E.	W.		5.0	.03
5	30-097	74.5	57.8	64.6	58.0	128.9		W.	W.		2.5	.02
6	105	71.9	48.7	60.7	57.2	133.9		W.	W.		8.0	.01
7	083	70.7	47.9	58.1	50.5	132.1		N. E.	N. E.		0.5	
8	30-003	67.7	44.8	57.6	50.9	119.0		E.	N.		4.0	
9	29-846	65.0	51.2	58.0	56.2	96.6		E.	N. E.		10.0	.06
10	710	72.0	54.9	63.1	60.0	118.0		S.	S. W.		7.0	.23
11	680	63.0	53.7	57.4	54.4	76.9		N. W.	N. W.		10.0	.71
12	641	65.6	50.1	55.4	54.7	118.3		N. W.	W.		8.0	1.01
13	765	65.0	47.6	54.9	49.0	124.1	42.4	W.	W.		4.5	.21
14	367	63.5	47.6	55.3	53.8	117.6	42.4	S.	S.		10.0	.64
15	359	61.7	51.0	55.2	51.8	108.7	48.4	N. W.	N. W.		10.0	.36
16	656	61.7	53.2	57.3	52.7	100.5	49.8	N. E.	N. W.		8.5	
17	912	63.2	53.7	56.7	51.6	100.7	48.7	N. W.	N. W.		9.5	.38
18	754	62.7	48.2	53.5	48.8	119.6	42.8	W.	N. W.		6.0	.10
19	778	58.7	41.9	47.8	42.8	103.7	31.2	W.	N. W.		5.0	.05
20	933	63.7	40.1	52.4	46.1	120.2	31.2	N. W.	N. W.		6.0	.10
21	29-961	63.2	48.4	54.1	51.4	98.7	44.8	S.			6.0	.02
22	30-045	66.8	51.0	58.6	56.7	105.6	45.6	W.	N. W.		10.0	
23	159	69.2	58.4	62.5	58.9	104.0	56.1	N. W.	N. W.		9.0	
24	131	62.5	56.2	58.4	55.1	81.2	56.1	N.	N.		10.0	
25	114	65.7	53.9	59.0	55.0	112.7	52.9	W.			9.5	
26	212	66.0	56.9	60.5	57.7	88.0	53.7	W.			10.0	
27	340	65.7	54.4	58.3	55.6	86.3	47.4	N. E.			5.0	.01*
28	492	63.7	49.9	54.6	51.9	88.8	45.0				0.0	
29	489	65.7	45.5	53.7	51.2	108.7	42.1				0.0	
30	30-407	59.7	42.1	49.7	47.7	75.4	38.8	N. W.			5.0	
Mean	29-997	67.4	50.8	58.0	53.9	109.8		...	...	...	6.2	Sum 3.94

* Fog.

OCTOBER, 1880.

Date.	Mean Readg of Barometr. reduced to Sea Level.	Temperature.						Wind.		Velocity. Miles.	Mean amt. of Cloud (0-10).	Rain. in.
		In the Shade.				Highest insun's rays.	Lowest on the grass.	Direction.				
		High- est.	Low- est.	Adop- ted. Mean.	Dew Point.			A.M.	P.M.			
1	ins. 30.211	67.2	45.0	55.5	50.6	113.0	89.0	N.E.	N.W.		4.5	in.
2	29.996	63.7	41.0	50.6	45.4	101.5	37.3	W.	W.		5.0	.16
3	.957	56.0	32.7	44.1	37.5	113.5	32.9	N.W.	...		3.0	
4	.654	45.2	36.9	41.0	38.6	56.7	34.2	S.E.	N.E.		10.0	1.21
5	.255	61.8	41.2	53.0	51.8	100.8	41.0	W.	W.		8.0	.18
6	.393	51.0	42.1	47.4	46.6	57.9	34.2	W.	S.		10.0	.98
7	.619	63.0	49.0	53.8	50.1	112.0	47.4	S.E.	E.		6.0	.12
8	.772	59.2	46.3	51.8	48.7	107.6	38.8	E.	N.		7.5	.02
9	29.758	53.1	45.3	49.7	46.6	61.9	43.8	N.E.	N.		10.0	.31
10	30.042	52.0	48.2	49.5	47.2	55.5	45.7	E.	E.		8.0	.11
11	.292	56.5	42.4	43.3	43.5	109.9	33.4	E.	E.		5.0	
12	.229	54.0	40.2	46.5	41.4	107.5	31.4	N.	E.		2.5	.02
13	.358	56.7	40.5	46.5	40.6	107.0	31.8	N.	N.		0.5	
14	.419	52.0	33.7	41.4	38.3	87.0	28.1	N.	N.		0.0	
15	.264	53.7	34.5	44.2	41.4	66.0	28.9	E.	N.		5.0	
16	.104	57.1	42.1	49.4	45.6	93.8	34.4	E.	E.		9.5	
17	.143	57.5	44.7	49.3	45.8	82.6	40.2	N.	N.		9.0	
18	.085	58.8	41.5	47.2	43.3	104.7	100.8	N.	N.		1.0	.02
19	30.037	47.5	38.7	41.9	38.2	72.5	30.2	N.	N.E.		10.0	.30
20	29.709	42.1	30.3	34.0	29.0	94.0	22.1	N.E.	N.		9.5	
21	.885	46.0	26.0	36.1	29.9	81.3	17.4	N.	N.E.		7.0	.03
22	.703	42.7	36.1	39.2	34.9	52.4	34.6	S.E.	E.		10.0	.18
23	29.967	46.8	33.8	38.8	32.3	91.6	24.7	N.E.	N.E.		6.0	
24	30.314	49.9	28.4	37.3	32.2	100.7	19.6	N.	N.		3.5	
25	30.147	48.8	28.4	39.1	36.4	79.4	23.4	N.	N.		6.0	.20
26	29.545	43.9	36.3	39.1	37.0	45.0	29.6	S.	E.		10.0	.74
27	29.222	57.4	38.1	48.2	47.3	64.3	38.0	E.	S.		10.0	.70
28	28.906	56.9	36.3	47.4	41.2	79.2	36.2	S.	W.		10.0	.22
29	29.807	44.1	32.7	37.0	32.0	73.3	23.6	N.	N.		4.0	
30	30.199	48.7	27.3	35.7	29.7	95.0	17.7	N.W.	N.W.		0.0	
31	30.156	50.9	30.0	40.3	36.2	98.8	21.2	W.	W.		5.5	
Mns.	29.908	53.0	37.7	44.6	40.7	85.7	32.0	...	...		6.3	Sum 5.50

NOVEMBER, 1890.

Date.	Mean Readg. of Baromtr. reduced to sea Level.	Temperature.						Wind.			Mean amt. of Cloud (0-10)	Rain.
		In the Shade.				Highst insun's on the rays.	Lowst. on the grass.	Direction.		Velocity Miles.		
		High- est.	Lowest	Adop- ted Mean.	Dew Point.			A. M.	P. M.			
1	ins. 30-268	46.8	34.1	39.2	33.4	93.2	27.9	N.	N.		5.0	in.
2	147	41.2	25.6	31.9	27.5	80.7	16.0	W.			6.5	
3	315	45.8	31.7	37.6	32.7	92.6	22.5	N.E.	N.		4.5	
4	453	45.1	29.8	34.8	29.3	88.6	21.1	N.	N.		4.0	
5	422	47.6	29.9	39.6	38.2	59.0	20.8	N.	N.		10.0	
6	405	50.0	39.8	44.2	40.2	69.2	32.7	N.	W.		8.5	
7	237	50.4	42.6	46.7	44.3	72.0	39.2	W.	W.		10.0	.13
8	366	51.6	32.9	40.6	35.2	93.1	23.8	N.	N.		4.0	
9	243	43.9	24.3	34.9	32.3	70.3	17.1	N.	W.		6.5	
10	148	53.7	42.0	46.2	41.6	98.4	29.6	N.	W.		9.0	.07
11	30 069	53.0	44.8	48.6	47.3	58.4	40.6	S.W.	W.		10.0	.03
12	29-998	52.8	47.6	50.4	48.6	76.2	42.0	W.	W.		10.0	.02
13	758	56.7	49.6	53.5	51.3	61.1	48.2	W.	W.		10.0	.15
14	281	56.0	50.5	53.2	52.0	66.7	49.6	S.W.	S.W.		10.0	.32
15	29-640	53.9	36.4	41.7	36.3	52.1	36.0	N.	N.		10.0	.59
16	28-913	52.5	36.6	43.9	38.0	93.2	35.5	S.W.	W.		5.0	.03
17	29-237	45.9	30.0	35.2	31.0	91.9	21.7	W.	N.		3.0	
18	022	34.1	24.9	29.6	29.4	35.9	17.0	E.	E.		9.5	.70
19	29-607	39.4	32.5	34.8	29.0	77.9	26.6	N.	N.		4.0	
20	30-321	38.4	25.2	30.8	24.8	95.5	20.6	N.	N.		0.0	
21	30-354	31.8	26.8	28.9	28.3	48.2	18.9	N.	N.E.		5.5	
22	29 966	32.3	15.8	22.9	19.5	76.5	16.3	N.			6.5	.06
23	895	42.9	27.3	36.3	35.3	...	26.4	S.	W.		10.0	.14
24	855	52.7	40.8	48.0	47.0	...	34.9	S.W.	W.		8.5	.54
25	798	53.8	41.8	47.0	41.9	...	34.0	W.	W.		4.5	.36
26	29-643	55.6	41.3	49.0	47.3	...	32.1	S.W.	N.W.		5.5	.10
27	30-165	51.4	39.3	43.3	38.0	...	28.5	W.	W.		0.5	
28	400	51.5	39.3	45.7	42.0	...	29.2	N.W.	N.W.		7.0	
29	431	51.7	41.4	44.8	41.0	...	32.6	S.W.	S.		6.0	
30	30-892	46.4	38.1	42.8	41.6	...	30.8	S.	W.		10.0	
Mean	29-992	47.6	35.4	40.9	37.2	...	29.1	...	...		6.8	Sum 3.24

DECEMBER, 1880.

Date.	Mean Readg of Baromtr. reduced to Sea Level.	Temperature.						Wind.		Velocity Miles.	Mean amt. of Cloud (0-10).	Rain.
		In the Shade.						Direction.				
		High- est.	Lowest	Adop- ted. Mean.	Dew Point.	Highest insun's rays.	Lowst. on the grass.	A.M.	P.M.			
	ins.											in.
1	30.189	49.7	44.0	46.3	44.2	°	38.6	S.	W.		5.0	.02
2	.315	48.1	31.9	36.5	32.5		24.7	N.			4.5	.01
3	.351	51.0	31.8	43.2	42.5	74.9	26.8	S.W.	W.		5.5	
4	.518	51.3	42.8	45.8	41.9	58.0	34.8	W.			6.0	
5	.528	51.2	40.6	46.1	42.5	66.5	30.8	W.	W.		5.5	
6	.553	49.9	45.9	47.7	45.7	58.3	41.9	W.	W.		10.0	
7	.661	50.3	45.4	47.1	43.6	63.0	40.5	W.	W.		10.0	
8	.605	48.9	45.7	47.1	43.0	54.9	44.8	W.	W.		10.0	
9	.470	50.9	44.8	47.1	44.4	59.0	36.8	W.	N.W.		7.5	
10	.389	53.4	40.5	45.7	42.0	67.9	32.8	N.W.	N.W.		5.5	
11	.270	46.7	32.2	39.3	37.2	74.4	24.0	N.W.	N.W.		1.0	
12	.179	49.0	42.2	44.5	38.5	77.0	36.0	N.W.	N.W.		8.5	
13	30.039	50.4	44.2	47.2	43.3	60.5	40.3	W.	N.W.		9.5	.03
14	29.996	49.8	34.7	41.8	40.0	49.0	35.6	N.W.	N.E.		10.0	.51
15	.624	51.7	33.2	44.6	43.4	53.0	33.7	N.W.	N.W.		9.0	.21
16	.627	46.8	37.3	41.6	38.2	51.4	36.5	W.	N.E.		9.0	.17
17	.726	38.3	33.1	34.9	29.6	39.0	31.1	E.	E.		10.0	.01
18	.562	44.9	31.1	37.1	33.6	49.9	27.7	W.	W.		8.5	.23
19	.555	42.9	36.4	38.7	36.2	74.3	32.7	W.	W.		10.0	.40
20	29.564	39.9	30.9	34.0	31.8	40.0	25.9	N.E.	N.		5.0	.10
21	30.028	42.5	29.5	34.4	31.6	77.5	21.8	N.W.	N.		0.0	.30
22	29.740	51.3	28.3	42.9	41.2	53.1	19.8	S.	W.		10.0	.18
23	.434	51.9	48.0	49.3	46.1	78.3	43.3	W.	W.		9.5	.32
24	.360	50.0	34.6	40.3	35.5	75.6	28.3	W.	W.		1.5	
25	.679	38.7	28.1	31.5	25.0	76.2	20.1	N.W.	N.W.		0.0	
26	.659	36.9	27.9	32.4	30.7	49.0	18.6	W.	S.		8.5	.28
27	.408	50.0	32.7	44.8	43.1	53.0	31.9	W.	W.		9.5	.31
28	.577	52.8	48.1	49.9	47.1	72.1	41.7	W.	W.		9.0	.03
29	.298	49.8	37.5	43.9	41.1	50.1	36.0	S.	N.W.		6.5	.84
30	29.542	41.7	28.5	33.3	30.7	55.0	23.2	N.	N.		5.0	.03
31	30.228	35.4	28.3	32.4	29.7	58.4	23.2	N.	N.		9.5	
Mns.	29.956	47.8	36.8	41.7	38.6	61.0	31.7	...	...	...	7.1	Sum 3.24

1890.

SUMMARY.

Month.	Mean Reading of the Barome. (reduced to Sea Level.)	Temperature.						Mean of all the Higest in the Sun's rays.	Mean of all the Lowest on the Grass	Degree of Humidity (Saturation=100)	Wind.						Amount of Cloud.	No. of Days it fell.	Rain.		
		In the Shade.			Dew Point.																
		Highest.	Lowest.	Mean of all the Higest.	Mean of all the Lowest.	Adopted Mean.	Highest.				Lowest.	N.E.	E.	S.E.	S.	S.W.	N.W.				
January	ins. 30-392	53.5	8.6	38.5	27.3	31.8	28.6	59.1	23.3	91	7	2	8	1	3	3	5	2	7.1	8	ins. 0.51
February ..	29-806	54.2	27.3	48.1	36.1	41.2	38.2	79.6	30.1	92	2	1	1	3	6	9	7	0	7.6	26	3.76
March	30-118	68.5	24.6	53.1	36.2	43.7	37.6	99.2	29.7	88	3	1	16	1	1	7	1	5.8	8	8	1.84
April	29-899	62.2	31.2	53.8	38.9	45.7	39.7	105.1	32.4	82	1	9	2	1	3	8	4	2	6.2	19	2.54
May	30-112	74.9	29.3	61.6	41.4	51.1	42.4	116.1	34.1	78	9	9	2	1	0	4	5	1	5.2	7	0.55
June	29-935	74.0	36.2	65.2	48.2	56.3	50.4	117.7	42.6	82	3	6	1	2	1	5	10	2	7.7	19	1.78
July	29-909	75.3	43.7	69.3	51.9	60.1	54.0	125.1	46.6	82	0	2	1	0	6	12	8	2	7.2	21	4.37
August	30-018	77.7	46.0	70.8	54.1	61.1	55.5	122.4	50.4	86	4	13	5	0	1	0	5	3	6.7	8	1.36
September ...	29-997	84.5	40.1	67.4	50.8	58.0	53.9	109.8	...	89	2	3	3	1	3	2	8	8	6.8	16	3.98
October	908	67.2	26.0	53.0	37.7	44.6	40.7	85.7	32.0	90	11	4	7	1	2	0	4	2	6.3	17	5.50
November ...	992	56.7	15.8	47.6	35.4	40.9	37.2	...	29.1	91	11	1	1	0	2	4	10	1	6.8	14	3.24
December ...	29-956	53.4	27.9	47.3	36.8	41.7	38.6	61.0	31.7	91	3	2	1	0	2	1	14	8	7.1	18	3.92
Year	30-004	84.5	8.6	56.4	41.2	48.0	43.1	...	...	86.0	56	53	48	11	30	49	87	32	6.7	181	33.26

SUMMARY OF THE WEATHER FOR 1880.

JANUARY.

"As the day lengthens
So the cold strengthens."

The weather during the first three or four days was rather mild, but fine, dry, and cold during the remainder of the month. The highest temperature was 58°5 on the 1st, the lowest 8°6 on the 28th, and the mean 31°8.

Atmospheric pressure was very uniform and greatly in excess of the average, the mean being 30·392 ins.; the highest reading 30·686 ins. took place at 9 a.m. on the 21st, and the lowest 29·968 ins. at 9 a.m. on the 1st. The rainfall was very small, the total amount being only 0·51 in. and the number of rainy days 8. Snow fell on 5 days, hail on one day, and fog occurred on 10 days.

FEBRUARY.

"You should on Candlemas Day
Throw candles and candlestick away."

The weather during this month was mild, wet, and windy. The highest temperature was 54°2 on the 20th, the lowest 27°3 on the 1st, and the mean 41°2.

Atmospheric pressure was nearly six-tenths of an inch lower, and subject to greater oscillation than in the preceding month, the mean being 29·806 ins. the highest reading 30·506 ins. took place at 9 a.m. on the 5th, and the lowest 28·986 ins. at 9 a.m. on the 16th. The rainfall was rather large, the total being 8·76 ins. which fell on 26 days. Fog prevailed from the 1st to the 6th, and a lunar halo was seen on the 25th.

MARCH.

"When the wind is in the east
The fisher likes it least."

This month was very fine, mild and dry, with a prevalence of easterly winds from the 9th to the 28th. The highest temperature was 63°5 on the 30th, the lowest 24°6 on the 29th, and the mean 45°7.

Atmospheric pressure was higher and much steadier than during the previous month, the mean being 30·118 ins.; the highest reading 30·494 ins. took place at 9 a.m. on the 8th, and the lowest 29·344 ins. at 9 p.m. on the 2nd. The total rainfall was 1·84 ins., which occurred on 8 days; no rain fell from the 10th to the 30th. Snow fell on the 1st and 2nd, hail on the 1st, and lightning was seen on the 10th. Fog occurred on 5 days.

APRIL.

"April showers bring forth May flowers."

The first half of the month was dull and showery, but the latter half was rather fine and dry. The highest temperature was 62°2 on the 19th, the lowest 31°2 on the 27th, and the mean 45°7.

Atmospheric pressure was a little below the average, the mean being 29·899 ins.; the highest reading 30·453 ins. took place at 9 a.m. on the 30th, and the lowest 29·291 ins. at 9 a.m. on the 4th. Rain fell on 19 days, the total amount being 2·54 ins. A thunderstorm occurred on the 6th; hail fell on the 6th, 7th, and 26th, and a lunar halo was seen on the 19th and 23rd. Fog occurred on the 7th.

MAY.

"The merry month of May."

The weather throughout the month was fine and bright, with a prevalence of north-easterly winds. The highest temperature was 74°9 on the 21st, the lowest 29°3 on the 1st, and the mean 51°1.

Atmospheric pressure was rather steady, the mean being 30·112 ins.; the highest reading 30·502 ins., took place at 9 a.m. on the 29th, and the lowest 29·742 ins. at 9 a.m. on the 3rd. The rainfall was very small, the total amount being only 0·55 ins., which fell on 7 days. Lightning was seen on the 26th, and fog occurred on the 3rd.

JUNE.

"Barnaby bright,
The longest day and the shortest night."

With the exception of the last few days the weather, during this month, was dull, cold and damp. The highest temperature was 74°0 on the 30th, the lowest 36°2 on the 10th, and the mean 56°3.

The mean atmospheric pressure was 29·935 ins.; the highest reading 30·262 ins. took place at 9 a.m. on the 28th, and the lowest, 29·584 ins. at 9 a.m. on the 20th. Rain fell on 19 days, the total amount being 1·73 ins. A thunderstorm occurred on the 26th; thunder was heard on the 14th and 22nd, and fog prevailed on the 11th.

JULY.

"Till St. James' day be come and gone
You may have hops and you may have none."

The weather was generally dull and showery throughout the month, with a prevalence of thunderstorms. The highest temperature was 75°3 on the 15th, the lowest 43°7 on the 5th, and the mean 60°1.

The mean atmospheric pressure was 29·909 ins.; the highest reading, 30·210 ins., took place at 9 a.m. on the 5th, and the lowest, 29·504 ins. at 9 a.m. on the 29th. The rainfall was in excess of the average, the total amount being 4·37 ins., which fell on 21 days. Thunderstorms occurred on 5 days, thunder on 1 day, lightning on 1 day, and fog on 4 days.

AUGUST.

"Dry August and warm
Doth harvest no harm."

With the exception of the first week, the weather was fine and dry, but rather cloudy with a prevalence of north-easterly winds. The highest temperature was 77°7 on the 10th, the lowest 46°0 on the 31st, and the mean 61°1.

Atmospheric pressure was rather low from the 1st to the 8th, but high and uniform from the 9th to the end of the month; the mean was 30·018 ins.; the highest reading 30·310 ins., took place at 9 a.m. on the 10th, and the lowest 29·294 ins. at 9 p.m. on the 7th. Rain fell on 8 days, the total amount being 1·35 ins. No rain fell from the 8th to the 23rd. Thunder occurred on the 2nd and thunderstorms on the 26th and 28th.

SEPTEMBER.

"The Michaelmas moon
Rises nine nights alike soon."

The weather was fine and warm from the 1st to the 8th, dull and wet from the 9th to the 21st, and then fine but foggy till the end of the month. The highest temperature was 84°5 on the 4th; this has only been exceeded once in September since the observations were commenced in 1865, when 85°5 was registered in 1868. The following figures show the highest temperature registered in each September during the past 16 years:—

1865	82·5	1869	73·2	1873	70·8	1877	66·5
1866	65·8	1870	70·0	1874	74·2	1878	73·4
1867	76·7	1871	78·0	1875	78·0	1879	70·7
1868	85·5	1872	76·6	1876	71·5	1880	84·5

The lowest temperature was 40°1 on the 20th, and the mean 58°0.

Atmospheric pressure was unsteady about the middle of the month and high during the last 4 days; the mean was 29·997 ins.; the highest reading 30·511 ins. took place at 9 a.m. on the 29th, and the lowest 29·199 ins. at 9 p.m. on the 14th. The total rainfall was 3·93 ins., and the number of rainy days 16; the greatest daily fall was 1·01 in. on the 12th. Fog occurred on 6 days, and a lunar halo was seen on the 18th.

OCTOBER.

"Good October, a good blast
To blow the hogs acorns and mast."

The weather during the first 10 days of the month was dull and wet, fine from the 11th to the 18th, and generally cold from the 19th to the end of the month. The highest temperature was 67°2 on the 1st, the lowest 26°0 on the 21st, and the mean 44°6.

Atmospheric pressure was subject to considerable oscillation, the mean being 29·908 ins.; the highest reading 30·484 ins. took place at 9 a.m. on the 14th, and the lowest 28·747 ins. at 9 a.m. on the 28th. The rainfall was very large, the total amount being 5·50 ins. The greatest daily falls were 1·21 in. on the 4th, 0·98 in. on the 6th, 0·74 in. on the 26th, and 0·70 in. on the 27th. The number of rainy days was 17. Snow fell on the 20th, fog prevailed on the 18th, and a lunar halo was seen on the 14th.

NOVEMBER.

"On St. Andrew's day
The night is twice as long as the day."

The weather was fine and cold from the 1st to the 9th, mild and rough from the 10th to the 16th, cold from the 17th to the 23rd, and mild from the 24th to the end of the month. The highest temperature was $56^{\circ}7$ on the 13th, the lowest $15^{\circ}8$ on the 22nd, and the mean $40^{\circ}9$.

Atmospheric pressure was uniform and high from the 1st to the 11th, but very unsteady during the remainder of the month. The mean pressure was 29.992 ins.; the highest reading 30.478 ins. occurred at 9 a.m. on the 4th, and the lowest 28.816 ins. at 9 p.m. on the 18th. Rain fell on 14 days to the amount of 3.25 ins.; the greatest daily fall was 0.70 in. on the 18th. Snow fell on 3 days, and fog prevailed on 5 days.

DECEMBER.

"Lucy Light
The shortest day and the longest night."

On the whole the weather during this month was very mild. The highest temperature was $53^{\circ}4$ on the 10th, the lowest $27^{\circ}9$ on the 26th, and the mean $41^{\circ}7$.

Atmospheric pressure was very high during the first part of the month and rather low during the latter part. The mean pressure was 29.956 ins.; the highest reading 30.672 ins. took place at 9 p.m. on the 7th, and the lowest 29.158 ins. at 9 p.m. on the 29th. The total rainfall was 3.92 ins. with 19 rainy days; the greatest daily fall was 0.84 in. on the 29th. No rain fell from the 3rd to the 12th. Snow fell on 5 days, and fog occurred on 3 days.

BOYS WEIGHED MARCH, 1874,-76,-78,-80.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
590	Aakwith, G.R. ...	vi	19-1	70-4 3-6	164-5 33-0	24-0 2-0	23-0 —	15-0 1-5	10-7 1-5
542	Bengough, O.S. ...	vi	19-1	72-8 3-3	152-5 13-2	26-4 2-9	23-5 —	14-0 0-5	9-5 0-3
47	Brodhurst, E.H.H.	Up. v	17-6	61-9 3-6	135-8 23-8	30-5 2-0	21-2 0-2	13-1 0-6	9-4 0-7
470	Brown, E.L.	M. Up. 2	16-4	66-0 4-7	127-5 28-0	31-5 3-5	22-1 0-6	13-5 0-5	9-4 1-4
29	Cholmeley, R.F.	vi	18-0	68-4 4-6	142-3 33-5	22-2 1-7	21-4 0-4	13-9 1-4	9-9 1-4
30	Davies, A. Ll.	vi	17-0	63-0 5-2	147-8 34-3	24-0 4-8	23-1 0-6	12-7 0-7	10-5 2-0
309	de Ooellogon, R.J.	Low. v. 1	17-2	67-8 3-6	113-0 15-5	30-0 1-0	21-7 0-2	11-5 1-0	9-0 1-0
276	§Douglas, R.G.	Up. v	17-11	70-0 7-2	149-5 43-0	24-6 4-6	23-5 0-8	13-9 1-2	9-7 0-7
79	Elton, O.	vi	18-8	71-9 1-4	153-0 11-9	33-7 1-2	23-7 0-2	13-5 0-8	10-0 0-5
273	Farrar, R.A.	vi	18-9	66-8 1-3	136-8 16-3	22-5 0-8	21-5 0-5	13-2 0-2	10-0 1-0
360	Fountain, A.	vi	18-0	70-3 3-3	150-8 22-3	31-9 2-4	23-1 0-6	14-0 0-8	9-5 1-3
213	Silver, E.W.	vi	17-3	71-0 5-2	146-5 20-2	22-0 3-0	23-5 0-5	13-7 1-2	9-5 1-0
26	§Tait, D.	vi	17-5	70-5 8-5	156-8 50-3	33-5 2-5	23-0 0-5	13-6 1-1	10-0 1-8
67	Tatham, W.M. ...	Mid. v	17-7	69-3 3-3	166-8 24-3	24-7 2-2	23-1 0-4	14-2 1-2	11-0 1-3
114	White, H.S.N.	vi	17-7	67-3 4-8	140-5 27-7	30-6 1-5	21-7 0-2	13-9 1-2	10-7 2-5

§ Four years' increase.

No.	Name.	Form.	House.	Born.	Age. Years.	Circumference of						Place of Birth.
						Height.	Weight.	Chest.	Head.	Leg.	Arm.	
						in.	lbs.	in.	in.	in.	in.	
77	Sharp, A.J.	Up. iv	M.H.G.	Dec. 23, 67—12-3	54-9	77-0	25-2	20-6	10-9	7-4		India
483	Shute, C.D.	Mod. L. 2	F.H.T.	Mar. 15, 66—14-0	61-9	92-5	26-2	21-1	11-5	7-7		Surrey
286	Sedgwick, C.T. ...	ii	R.A.	Mar. 5, 68—12-2	57-2	80-0	25-5	21-0	10-9	7-1		Yorkshire
356	Tufnell, F.T.	ii	R.A.	Ap. 5, 67—13-0	56-8	82-8	25-9	21-5	11-2	7-0		Essex
405	Waddilove, R.A.W.	Low. Sh.	T.A.P.	May 10, 67—12-11	58-3	76-5	25-6	20-0	10-7	6-9		London
442	Williams, A.P.W.	Mod. L. 2	A.H.B.	Jan. 7, 67—13-4	59-8	101-5	27-5	20-7	11-5	8-5		Dorset
446	Wise, P.F.	Low. iii	W.F.	Oct. 23, 66—13-6	61-0	88-8	25-5	23-7	11-5	7-0		India
473	Worship, H.L. ...	Low. Sh.	W.F.	Sept. 12, 67—12-6	58-8	68-0	24-7	20-4	10-5	7-0		Kent
441	Wright, J.J.	ii	R.A.	May 6, 67—12-11	56-3	89-8	27-9	21-6	11-1	8-2		Yorkshire

BOY WEIGHED JULY, 1874; MAY, 1876; JUNE, 1878; JUNE, 1880.

No.	Name.	Form.	Age. Year.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
489	Tanner, E.	M. Up. 1	17-0	65-5 8-2	130-0 40-2	34-0 7-5	22-2 0-2	13-7 1-7	10-2 2-0

BOYS WEIGHED JUNE, 1875; MAY, 1877; MAY, 1879; MAY, 1880.

52	Bullock S.L.	Mid. iv	15-8	62-5 1-5	101-8 5-8				
476	Butler, G.W.	vi	18-8	61-5 3-0	102-0 15-5				
389	Fanshawe, R.	M. Up. 2	16-5	63-8 2-5	110-0 12-5				
27	Hawkins, J.E. ...	M. Low. 1	16-5	64-0 3-0	118-0 19-5				
396	Finder, J.H.	vi	18-1	67-6 1-1	146-5 12-5				
124	Ward, E.	Mid. v	16-5	67-7 2-2	131-5 10-5				
180	Westcott, G.H. ...	vi	18-0	62-9 1-2	125-3 9-8				
218	Williams, A.W.A.	Up. Sh.	15-3	60-0 2-7	110-8 9-8				

BOYS WEIGHED JUNE, 1876; MAY, 1878; MAY, 1880.

264	Callendar, W.J. ...	Low. v 2	15-9	64-2 5-9	115-5 24-2	30-7 2-2	22-2 0-2	12-0 0-8	9-4 0-3
21	Davies, M.L.	vi	15-7	63-5 4-2	115-8 22-3	29-0 1-0	21-6 0-1	11-2 0-7	9-0 0-5
289	D'Urban, W.H.M.	Mod. U. 2	15-8	63-0 6-0	109-8 29-8	28-7 2-0	22-2 0-7	12-7 2-7	8-7 2-7
119	Dyson, J.P.H.	vi	17-9	64-0 2-0	137-5 20-0	31-5 1-8	21-2 0-2	13-0 —	10-4 0-7
208	Feetham, E.	Up. iv	16-10	67-3 5-3	118-5 26-2	28-7 2-2	21-7 0-2	12-5 1-0	8-5 0-8
200	Fisher, J.	Mod. Up. 1	18-1	71-0 4-2	153-3 25-3	33-5 1-0	22-5 0-5	13-2 0-7	9-2 0-7

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lb. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
443	Fletcher, E.	Up. v	17-3	65-5 5-2	120-0 24-7	29-2 1-7	22-2 0-2	12-5 1-0	9-0 1-0
177	Hardy, R.	Mod. L. 1	15-0	61-1 4-1	119-5 20-2	30-0 1-5	22-5 1-0	13-1 0-6	9-9 0-8
510	Balleston, H.D.	Low. v. 1	17-10	68-6 4-6	141-0 34-2	31-4 3-9	22-2 0-5	13-1 1-1	8-8 1-1
169	Street, W.	Mod. M. 2	15-10	67-9 6-6	137-8 43-0	31-0 4-0	22-6 0-6	13-7 2-7	9-2 1-2
440	Wynyard, W.B.A.	Up. Sh.	16-6	67-9 8-1	150-5 21-2	32-5 1-0	22-7 0-2	13-5 —	9-7 0-7

BOYS WEIGHED MAY, 1877; MAY, 1879; MAY, 1880.

503	Alexander, D.B.H.	Mod. U. 2	17-3	69-0 1-5	149-0 12-5				
292	Cannon, P.H.	Up. iii	13-11	58-4 1-9	93-0 10-0				
543	Cunningham, R.H.	Mod. M. 2	15-10	63-3 2-3	113-5 15-5				
118	de Jersey, W.B.	Low. v. 1	17-1	66-2 3-2	120-5 19-5				
563	Druitt, A.	Up. v	16-10	68-9 0-9	145-0 2-7				
408	Fox, W.H.	Low. v. 2	16-4	62-3 2-3	105-8 11-3				
459	Fox, G.	Up. iv	14-7	59-2 3-2	103-5 15-0				
80	Harrison, T.D. ...	Up. Sh.	16-9	71-0 1-7	150-8 12-8				
436	Haughton, W.J.	Mod. U. 2	16-7	69-5 0-5	147-0 10-0				
307	Jukes, T.G.	Up. Sh.	16-1	65-3 3-3	127-5 14-5				
364	Larkworthy, G.C.	Low. v. 2	16-2	65-5 2-7	123-3 18-1				
163	Leach, F.	Up. iv	16-9	68-5 3-0	133-5 14-5				
243	Leigh, J.B.	Up. v	17-11	67-5 1-7	129-0 15-0				
98	Nicholson, W.E.	Mid. iv	14-1	52-8 1	70-0 4-5				
320	Pawle, E.D.	Up. iv	15-9	66-2 2-9	136-5 15-5				
388	Prest, E.P.	Mod. U. 1	16-3	67-0 2-0	135-5 11-5				

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
260	Ravenhill, W.R. ...	Mod. U. 2	15-7	65-0 3-0	127-5 15-5				
325	Reiss, H.J.	Low. v 1	15-9	63-5 2-5	116-0 12-0				
504	Steel, E.E.	Mod. L. 2	15-10	63-0 3-0	113-5 17-0				
166	Stothard, E.A.W.	Mod. U. 2	16-1	65-8 2-8	114-0 10-0				
8	Tanqueray, A.H.	Up. v	16-2	68-8 1-0	155-0 7-5				
340	Taylor, C.W. ...	Mod. M. 1	16-0	66-7 3-9	130-3 26-5				
452	Tulloch, C.	Mid. iv	16-0	62-5 2-0	100-0 4-7				
501	Walker, F.W.	Up. Sh.	16-0	60-8 1-3	100-8 7-0				

BOYS WEIGHED MAY, 1878, 1880.

128	Adams, E.P.	M. L. 2	14-10	65-0 7-7	90-5 9-7	28-5 1-0	21-5 0-3	10-7 0-7	8-0 0-8
359	Beale, E.L.	Mod. U. 2.	16-7	68-0 5-2	135-8 35-0	31-2 3-7	21-2 0-7	12-7 1-2	9-9 1-9
65	Beatson, D.J.M. ...	Mod. M. 1	15-8	65-4 4-6	114-5 22-2	30-0 3-0	21-6 0-1	12-2 1-2	8-5 0-8
529	Bengough, C.F. ...	Up. Sh.	16-1	61-7 3-4	102-0 15-5	28-5 1-5	21-7 —	11-7 1-0	8-5 0-8
357	Boniton, R.H.W.	Mod. M. 1	17-0	66-0 5-0	143-0 24-7	31-5 2-0	22-1 0-6	12-7 0-7	10-0 0-8
238	Chittenden, G.S.	Low. v 1	16-1	63-2 4-2	119-0 17-5	31-5 3-5	23-2 0-2	12-7 0-7	9-0 0-8
187	Cholmeley, H.W.	Up iii	13-1	55-0 3-0	73-3 12-3	24-5 3-0	20-9 0-4	10-7 0-7	6-7 0-5
201	Creeke, H.B.	Low. v 1	15-4	64-1 6-3	106-0 27-0	30-0 3-0	22-0 0-5	12-0 1-5	9-2 2-0
566	Debenham, G.D. ...	Up. iv	14-8	64-0 2-2	103-5 12-0	27-5 0-8	21-7 1-2	11-4 0-4	8-5 1-3
282	Dobie, L.J.	Up. Sh.	16-3	66-2 6-2	113-0 27-0	29-9 3-4	22-4 0-7	12-0 1-0	8-7 1-5
380	Freeman, H.R. ...	Low. v 1	16-1	61-0 3-7	101-8 15-0	28-9 1-4	21-9 0-7	12-1 1-1	9-0 1-0
333	Heaton, K.	Mod. M. 1	15-8	65-0 3-7	127-8 23-3	31-5 3-0	22-5 0-5	12-0 1-0	9-5 1-3
144	Hedley, W.C.	Mod. U. 1	14-4	63-6 4-3	111-0 18-7	30-5 4-0	22-1 0-6	12-0 0-8	8-5 0-5
188	Highton, G.A. ...	Up. iv	16-7	67-2 4-7	136-0 28-7	31-0 2-3	22-1 0-4	12-5 1-8	10-7 2-2

Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
181 Hovell, R. de B....	Up. Sh.	15-4	63-7 4-4	103-5 19-0	27-7 0-2	21-2 0-2	12-0 1-0	8-4 1-2
221 Hovell, D. de B....	Low. iii	14-3	57-7 3-2	88-0 11-5	27-0 1-0	21-2 0-2	11-1 0-4	7-7 0-7
317 Leach, N.	Up. iv	13-1	56-8 3-3	80-0 12-7	26-2 0-2	21-1-0-1	10-2 -0-3	7-1 0-4
183 Mangin, R. B.	Mid v	16-6	67-2 6-4	136-3 34-5	30-7 1-7	21-4 0-7	13-5 1-5	10-2 2-0
519 Nicol, W. J. W. ...	Mod. M. 2	16-2	60-0 5-7	103-3 24-3	28-7 1-7	21-0 0-5	12-2 1-2	9-0 1-3
343 Ouvry, E. O.	Up. iii	13-9	56-7 2-9	80-0 8-7	26-0 -0-5	20-9 0-4	10-0 —	7-5 0-3
494 Palgrave, A. G. ...	Mid. iv	14-10	59-3 2-8	92-8 11-0	27-7 1-7	21-7 0-2	11-0 -0-2	7-7 0-7
9 Sandeman, V. S. ...	Mod. L. 2	13-11	60-7 4-7	100-0 17-7	28-0 1-5	21-5 —	12-0 1-0	8-5 1-0
60 Streatfeild, H. C. ...	Up. Sh.	13-6	60-8 3-3	101-5 23-7	28-0 0-8	21-5 0-5	11-7 1-2	8-7 1-5
400 Tucker, J. C.	Mod. L. 1	16-1	64-6 5-1	111-0 25-7	31-0 3-0	21-4 0-7	12-5 1-0	7-6 0-6
375 Wilson, S. B.	Up. Sh.	15-5	61-3 3-0	93-5 12-7	26-7 0-7	21-5 0-3	11-0 0-5	8-1 0-9

BOYS WEIGHED MAY, 1879 AND 1880.

274 Badcock, A. J.	Up. iii	13-11	56-0 1-5	77-5 4-5				
581 Brooke, A. D.	Mod. U. 2	14-7	68-7 1-2	147-5 3-5				
583 Brooking, A. H. ...	Mid. iv	14-5	64-0 1-5	100-0 2-0				
271 Browne, G. H. S. ...	Up. iv	13-9	63-9 1-1	108-3 11-0				
337 Collett, B. S.	Low. iv	14-3	59-5 2-5	93-5 12-0				
514 Colley, F. O.	Mid. iv	15-2	61-0 2-5	97-0 12-5				
389 Cooper, G. E.	Up. iii	13-9	58-3 2-5	80-5 2-5				
486 Davis, E. H.	Up. iv	14-9	68-5 3-0	128-5 19-5				
584 Doering, W. H. ...	Mod. L. 2	15-5	69-0 3-0	131-3 13-8				
515 Fielden, G. N.	Low. iv	14-5	63-1 1-6	101-5 5-0				

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.
482	Few, R.E.	Mod. L. 1	14-9	59-3 1-3	92-0 6-7
294	Fox, H.O.	Mod Up. 2	14-8	66-6 2-1	118-0 14-0
466	Ganon, J.P.	Up. iv	15-1	63-1 2-8	107-3 10-8
194	Gregory, C.A.O.T.	Low. Sh.	13-0	55-0 1-0	75-5 0-5
493	Gregson, L.S.	Mod. L. 1	15-0	61-5 3-2	96-3 12-3
216	Grove, A.S.	Up. iv	15-10	61-1 2-6	100-0 12-5
582	Hart-Dyke, B.P.	Up. iv	15-6	59-6 1-1	92-0 3-0
331	Home, J.A.	Up. iii	13-10	55-9 1-1	79-8 6-8
94	Jessett, G.F.	Mod. L. 1	14-6	57-7 1-7	90-3 2-8
491	Kruger, J.C.	Low. Sh.	12-8	55-6 1-1	81-8 4-3
586	Leslie, B.	Up. iv	14-7	59-0 0-7	93-8 9-8
583	McIlwraith, B.M.	Up. iv	14-9	65-2 3-2	121-0 14-7
372	Mead, F.J.	Mod. M. 1	14-7	62-1 2-8	107-1 10-6
158	Mellish, J.S.	Mod. M. 2	15-9	67-3 7-3	131-0 13-0
173	Nicholson, J.	Mid. iv	13-5	62-0 1-0	97-3 9-5
229	Pepys, H.F.	Low. iv	14-11	57-3 2-0	86-3 7-3
461	Proctor, B.G.O. ...	Low. iv	11-11	53-0 1-5	69-5 4-5
117	Robertson, J.O. ...	Mid. iv.	14-0	61-8 1-5	104-3 8-3
219	Stileman, C.F. ...	Mid. iv.	15-4	59-2 2-9	100-0 13-5
199	Street, C.	Low. iii	13-8	59-0 1-7	100-0 8-0
350	Swinton, J.E.B. ...	Mod. M. 2	15-9	67-2 0-9	131-0 17-0
262	Teesdale, E.J. ...	Up. 3	14-0	59-1 2-6	101-5 7-5
307	Villiers, W.N.	Mid. iv	15-4	64-3 1-3	115-8 8-3
378	Wansey, A.A. ...	Mid. iv	14-8	62-0 4-2	112-5 13-0
587	Yeates, F.W.	Mid. iv	14-5	65-4 3-4	123-0 16-0

BOYS ENTERED MAY, 1880; WEIGHED MAY, 1880.

No.	Name.	Form.	House.	Born.	Age.		Height.	Weight.		Chest.	Circumference of Head.		Arm.	Place of Birth.
					Years.	in.		lbs.	in.		in.	in.		
561	Allen, P.E.	Low. iv.	F.E.T.	May 14,	66—13-11	59-0	83-0	26-9	21-0	10-5	7-5	7-5	Ballington, Essex	
570	Batley, R.A.	ii	F.E.T.	Ap. 7,	63—12-0	58-4	83-0	26-0	20-5	10-5	7-5	7-5	Huddersfield	
383	Berkeley, R.T.M.	Low. Sh.	R.A.	Sep. 25,	67—12-7	54-5	80-0	26-0	20-5	10-5	7-4	7-4	Brighton	
415	Bett, J.C.	Low. Sh.	W.F.	Aug. 4,	68—11-9	58-9	100-5	27-0	21-5	13-5	9-0	9-0	Sydenham, Surrey	
496	Brooke, R.G.	Mod. M. 1	W.F.	Sept. 25,	66—13-7	60-1	98-5	28-5	23-0	10-7	7-6	7-6	{ Colebrooke, Fermanagh	
182	Burrows, P.	ii	R.A.	Aug. 11,	63—11-8	54-6	84-5	26-0	21-1	12-0	8-0	8-0	{ Twickenham, Middlesex	
244	Casson, H.A.	Low. iv	H.B.H.	May 19,	67—12-11	58-5	90-8	26-5	20-5	11-2	7-9	7-9	{ Wold, Northamp- tonshire	
89	Clayton, F.	Low. iv	G.S.	Ap. 29,	67—13-0	59-2	82-5	26-0	20-1	10-5	7-2	7-2	Point Louis, Quebec	
484	Colville, H.O.A. ...	ii	W.F.	May 11,	63—11-11	59-8	91-5	26-5	21-6	11-0	7-5	7-5	Anfield, Liverpool	
395	Cooper, H.J. ...	Low. iii	R.A.	Nov. 21,	67—12-5	57-5	84-3	25-5	21-7	11-2	7-9	7-9	Chili	
502	Dawson, E.B.	Mid. iv	W.E.M.	Sept. 18,	65—14-7	68-9	112-0	28-1	21-5	12-5	8-1	8-1	London	
267	Dobie, H.	Up. iv	L.E.U.	June 6,	65—14-11	57-0	76-3	25-0	21-0	10-0	7-0	7-0	Chester	
164	Elles, J.M.	Mod. L. 1	H.B.H.	Feb. 3,	66—14-3	58-6	95-5	27-7	21-4	11-5	8-4	8-4	Wimbledon, Surrey	
539	Falkiner, J.P.E. ...	Mod. L. 2	J.B.G.	Oct. 2,	67—12-7	57-3	92-0	27-0	21-0	11-9	7-6	7-6	{ Wimpole-Street, London	
48	Field, A.B.	ii	R.A.	June 29,	68—11-10	56-5	76-0	26-6	21-7	11-0	7-2	7-2	Clapham, Surrey	
540	Forbes, J.O.	Low. iv	J.B.G.	Jan. 21,	67—12-3	61-3	97-5	27-5	21-2	11-1	7-7	7-7	Aberdeenshire	
550	Hill, H.B.	Low. iii	R.A.	Mar. 21,	67—13-1	61-9	99-5	27-5	21-7	11-5	7-9	7-9	Piccadilly, London	
261	Hill, R.B.	Low. Sh.	R.A.	June 2,	68—11-11	57-1	89-0	26-5	21-7	10-7	7-7	7-7	{ Monington, Here- fordshire	
559	Jenner, L.L.O.A.	Low. iv	J.B.G.	Dec. 2,	65—14-5	60-5	105-0	27-0	21-7	12-7	8-2	8-2	London	
407	Langworthy, J.D.	Low. iii	T.A.P.	Jun. 26,	67—12-10	53-0	73-5	25-5	21-2	10-5	7-1	7-1	London	

No.	Name.	Form.	House.	Born.	Age. Years.	Height. in.	Weight. lbs.	Circumference of			Place of Birth.
								Head.	Leg.	Arm.	
						in.	lbs.	in.	in.	in.	
412	Langworthy, R. ...	Low. iii	T.A.P.	Nov. 25, 68—11-5	53-8	72-0	25-1	20-9	11-0	7-0	London
455	Lowndes, H.M. ...	Mod. L. 2	W.M.	Nov. 11, 66—13-5	57-7	83-3	25-5	22-0	11-0	7-1	Brenston, Rugby
41	Morgan, A.F.	ii	R.A.	May 10, 68—11-11	54-9	68-0	24-5	21-7	10-5	6-5	Bath
82	Paine, W.H.O. ...	ii	R.A.	Nov. 13, 68—11-5	49-8	67-5	24-7	20-9	10-0	7-0	{ Ashton-on-Mersey, Cheshire
309	Percival, H.P. ...	Low. Sh.	R.A.	P 68—11-3	53-4	71-0	25-7	22-0	9-3	7-0	Northants
477	Petrie, O.L.R.	Mod. L. 1	J.B.G.	Dec. 15, 66—13-4	56-1	82-5	25-5	21-0	10-9	7-5	Oalleo
87	Rotheram, W.H.	Mod. M. 2	J.P.W.	Feb. 17, 66—14-2	69-0	132-0	31-0	22-5	13-0	8-9	{ Kilbrode, Trim. Meath
179	Silver, A.O.	Low. iv	G.S.	May 20, 65—14-11	59-3	92-5	27-7	21-5	11-0	8-3	London
55	Thompson, L.A.V. ii		R.A.	Mar. 10, 68—12-1	55-7	96-0	26-7	21-0	12-3	8-5	London
168	Walker, L.S.	Low. Sh.	R.A.	July 3, 69—10-10	53-5	72-0	25-4	21-3	10-2	7-7	{ Doddington, Cam- bridge
161	White, B.F.	ii	R.A.	May 9, 67—12-11	55-0	77-0	26-1	21-0	10-0	7-5	Dublin
15	Williams, W.S. ...	Low. iv	L.E.U.	May 29, 66—13-11	58-5	89-5	26-9	20-5	11-0	7-9	Corwen
312	Zachary, T.	Mod. L. 2	H.B.H.	Jan. 21, 66—14-3	66-3	124-0	29-7	21-5	12-5	9-0	Cirencester

BOYS WEIGHED OCTOBER, 1874,—76,—78,—80.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
14	Bryant, F.J.	Up. v	18-0	64-3 1-8	122-8 9-0	32-0 1-3	21-1 0-1	12-5 0-5	9-4 0-7
326	Callendar, H.L. ...	vi	17-6	71-0 4-0	141-0 27-0	33-5 2-3	22-1 0-1	12-5 0-5	9-8 0-6
71	Glyn, A.P.	Up. Sh.	16-5	71-0 2-0	148-0 13-0	33-0 4-0	23-0 1-0	15-3 1-3	10-4 1-7
245	Kerry, A.P.	Up. v	18-4	66-5 3-5	135-0 20-7	33-5 3-0	21-4 0-2	13-5 1-0	9-5 0-3
429	Lawrie, H.L.	Up. iv	16-7	66-7 5-2	126-0 31-2	30-4 2-7	21-5 —	13-2 1-3	9-4 1-4
341	Tanner, M.	Low. v 2	16-0	66-0 9-5	132-0 47-0	30-0 2-5	22-7 0-5	13-4 1-9	9-0 1-3

§ Four years' increase.

BOYS WEIGHED OCTOBER, 1876,-78,-80.

No.	Name	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
223	Aldworth, A.E. ...	Up. Sh.	16-5	59-1 2-8	84-5 8-5	26-5 —	20-6 0-1	10-5 0-5	7-8 0-8
33	Alaton, F.S.	Low. v 1	16-10	68-1 4-1	132-0 24-2	30-9 2-4	21-9 0-9	12-5 0-5	9-0 0-5
479	§Baker-Gabb, R.F.W. Low. v 1		16-4	64-5 10-0	116-0 38-5	30-5 5-3	21-6 0-6	12-5 1-5	8-1 0-6
247	Casson, F.G.	Low. v 2	16-7	67-3 5-0	113-8 20-8	30-5 3-0	21-1 0-1	11-5 0-8	8-1 0-4
104	Chioester, A.G.V	Up. iv	15-9	64-7 5-4	122-0 27-0	29-5 2-5	21-7 0-2	12-5 1-0	9-0 0-5
534	Cooke, T.W.	Mod. Up. 2	16-4	70-2 4-2	162-0 31-5	32-8 3-8	22-0 0-5	13-3 0-8	9-0 0-8
265	§Curtis, A.	Low v 1	15-0	59-6 6-1	85-5 21-5	26-0 1-5	21-3 0-3	10-6 2-9	7-2 0-2
141	Eliot, P.H.	Up. v	18-1	68-8 4-8	139-5 31-5	30-6 2-6	21-8 0-1	13-5 1-0	9-3 1-3
402	Ellison, D.	vi	17-9	67-6 6-1	137-3 31-8	30-8 2-8	22-4 0-2	13-3 0-6	9-5 0-8
472	§Ferguson-Davie W.J. Mod. Up. 1		17-4	66-1 7-1	122-5 30-5	31-5 4-0	21-0 0-5	13-0 1-3	8-6 0-6
11	Gardiner, E.N. ...	vi	16-9	63-5 6-5	131-5 40-5	31-8 2-8	22-0 0-5	13-7 1-7	9-8 1-3
3	Hawkins, A.H. ...	vi	17-8	68-0 2-0	145-8 16-3	33-0 1-0	22-2 0-2	13-6 0-6	9-8 0-8
126	Hooper, C.H.	Mod. M. 2	17-1	64-3 3-0	109-5 15-5	28-5 0-5	21-3 0-1	11-8 0-1	8-8 0-6
305	Martineau, H. ...	Mod. U. 1	16-1	65-1 6-1	114-3 30-3	28-8 1-8	21-0 —	11-3 0-8	8-6 0-9
306	Martineau, L.	Mod. U. 1	14-7	64-5 4-0	114-0 17-5	28-4 0-9	21-0 —	12-0 0-5	8-7 0-2
70	Mason, F.E.	Mod. U. 2	18-0	63-9 4-6	123-8 28-5	31-0 3-5	22-0 0-3	12-6 1-4	8-7 0-7
116	Mocatta, E.H. ...	Mod. L. 1	15-4	61-0 6-5	111-0 30-0	29-4 3-4	21-1 0-4	13-0 2-0	8-8 0-8
211	Page, F.G.J.	Mid. v	17-10	68-6 5-1	137-8 23-8	31-3 1-3	21-2 0-2	13-5 0-8	9-4 0-4
85	§Shears, A.J.	vi	18-3	64-8 7-0	132-8 33-5	31-7 3-7	22-3 0-6	13-2 1-2	9-3 0-6
97	Vincent, E.C.	Low. v 1	16-6	60-9 4-4	102-5 21-7	28-9 3-4	20-1 0-1	12-0 0-8	8-1 0-4
121	Waschops, D.M.	Low. v 1	16-7	68-0 4-5	144-0 32-0	32-4 3-9	22-0 0-3	13-0 0-5	9-9 1-2
411	White, E.D.	Mod. M. 1	15-8	60-0 3-2	97-5 17-0	27-8 2-3	21-5 0-2	11-9 0-7	8-0 —
183	Wynne, O.	Up. Sh.	16-5	61-9 6-1	120-8 25-3	31-8 3-3	22-0 0-3	12-0 0-5	8-9 0-9

§ Four years' increase.

BOYS WEIGHED OCTOBER, 1877,-79,-80.

No.	Name.	Form.	Age Years.	Height.		Weight.	
				in.	inc.	lbs.	inc.
280	Adams, E.E.	Mod. L. 1	15-11	64-2	8-4	110-8	17-8
480	Beaumont, H.O.O.	Mod. U. 2	16-6	66-8	0-8	149-0	7-7
287	Beeton, O.	Mid. v	16-10	66-2	1-9	125-0	14-7
401	Beeton, M.M.	Up. v	15-6	64-2	2-9	122-8	19-8
458	Benson, R.P.	Mod. U. 1	16-11	73-0	3-0	141-7	15-7
74	Bradburne, O.E.	Low. iv	14-7	64-8	3-0	109-0	10-8
574	Brinton, H.	vi	17-8	67-7	2-2	140-8	16-8
249	Bryant, A.H.	Mid. iv	15-4	68-6	2-8	138-8	18-8
276	Casley, W.S.	Low. v 1	17-2	67-0	0-5	138-8	7-8
125	Chichester, A.G.D.V. Mod. M. 2	18-11	56-1	1-3	88-5	6-0	
12	Codrington, O.T.	Mod. L. 2	15-8	61-8	2-0	108-5	11-5
10	Donne, J.R.	Low. v 1	17-4	70-2	2-7	148-0	21-0
220	Earle, S.	Low. v 2	15-9	66-8	3-5	132-0	16-0
1	Elliot, G.J.	vi	18-5	68-0	2-5	107-5	9-5
115	Firth, E.O.O.	Mid. v	14-0	62-8	3-5	110-5	15-7
555	Forbes, D.	Mod. U. 2	15-8	63-0	3-0	109-8	16-8
564	Gordon-Maclean, O. Mod. U. 1	16-9	67-8	2-8	127-0	12-5	
88	Innes, A.D.	vi	17-0	66-8		119-0	
316	Laidley, O.E.	Mid. v	16-8	65-1	0-8	131-8	6-0
122	Latier, E.	vi	17-7	67-2	1-9	139-5	18-7
76	Lewis, W.B.	Mod. M. 2	16-4	66-6	3-6	132-0	22-2
72	Maclean, A.H.H.	vi	16-11	67-0	0-2	145-5	8-5
19	Maddock, P.H. ...	vi	17-5	66-2	1-7	133-5	18-2

No.	Name	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.
291	Martin, A.W.	Mod. M. 2	16-8	69-0 1-0	133-0 8-5
273	Millais, J.G.	Mld. iv	15-6	61-2 2-2	92-5 9-5
153	Moore, W.	Up. iv	14-10	66-4 1-6	114-3 8-5
164	Moore, J.	Mld. iv	14-8	60-1 1-8	98-5 7-2
437	Mounsey, H.J. ...	Up. Sh.	17-1	66-4 0-9	133-5 4-0
173	Pedder, E.	Mld. iv	15-9	60-3 2-3	108-3 11-3
252	Richards, W.	Mod. U. 1	17-5	65-0 1-5	130-3 13-0
18	Roberts, G.H.	vi	15-1	63-9 3-4	124-0 17-0
437	Rogers, G.F.V. ...	Up. Sh.	16-4	63-3 2-0	108-5 10-5
315	Rogers, W.A.F. ...	Up. Sh.	16-2	66-0 3-0	153-5 24-0
296	Routledge, G.B. ...	Mld. iv	16-10	63-3 2-5	110-0 16-7
147	Stanton, F.W.S. ...	Mod. U. 1	17-2	63-5 6-2	170-5 11-0
506	Stephenson, C.M.	Mod. U. 2	17-1	67-5 2-0	134-5 10-2
212	Stokes, W.G.G. ...	vi	17-8	63-1 0-6	133-3 5-5
53	Streatfeild, W.O.	Low. v 2	15-1	63-2 4-3	117-3 19-3
518	Vaughan-Johnson, B.	Low. v 2	17-1	67-5 4-0	130-3 14-0
248	West, H.	Mld. iv	15-11	63-5 3-7	109-0 17-3
420	Wilson, J.B.B. ...	Up. Sh.	15-5	64-2 3-3	125-0 14-0

BOYS WEIGHED OCTOBER, 1878, AND OCTOBER, 1880.

No.	Name	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
346	Adamson, J.W. ...	Up. iv	16-9	65-0 6-2	133-0 29-0	29-5 8-0	21-0 0-8	13-5 1-3	8-7 1-0
73	Annesley, E.O. ...	Up. Sh.	15-5	61-6 4-1	106-5 20-0	27-6 1-3	21-0 —	12-0 0-5	8-4 6-4
45	Bailey, H.J.	Up. iv	14-10	61-3 3-3	114-0 15-5	28-3 1-3	21-5 —	13-0 0-3	9-0 1-0

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
337	Bligh, F.	Mod. L. 1	14-4	59-0 3-7	96-3 14-0	28-0 1-5	20-7 0-2	11-2 0-5	7-9 0-2
340	Bliss, C.E.	Up. iii	13-10	60-8 8-0	90-0 10-7	27-5 —	22-0 —	10-8 0-6	7-0 —
358	Boger, D.O.	Mod. M. 2	15-0	63-7 5-7	114-0 29-5	28-8 2-8	22-1 0-1	12-2 1-2	8-5 1-0
37	Bradley, H.V.	Up. v	15-7	64-5 6-0	115-8 27-3	29-8 2-3	22-1 0-6	12-5 1-5	8-2 1-2
509	Carvey, H.M.	Mod. U. 1	16-10	67-8 3-0	143-0 23-0	33-2 3-2	22-0 0-5	12-4 0-4	9-0 0-5
139	Chappel, H.B.	Up. Sh.	13-6	60-9 8-4	102-5 14-5	27-5 1-0	22-0 —	12-5 0-5	7-8 —
133	Coates, H.W.U. ...	Up. iv	14-10	62-9 3-9	101-5 11-5	28-0 1-0	21-8 0-1	12-0 0-5	7-8 0-8
449	Cooper, T.	Low. v 2	17-3	72-3 2-5	154-5 23-7	23-6 1-6	22-1 0-1	13-0 0-5	9-0 0-5
499	Crommelin, A.O. ...	Mid. v	15-8	60-5 3-5	95-5 14-2	26-8 0-6	21-2 0-7	10-8 0-3	8-0 0-3
498	Dawson, A.E.	Up. Sh. (a)	16-9	63-2 5-7	130-0 18-0	29-7 1-2	22-2 0-2	12-6 0-5	9-1 0-4
385	Dobson, F.T.S. ...	Mod. U. 2	16-5	62-5 4-0	140-0 20-2	31-9 3-2	21-5 —	12-8 0-8	9-4 0-4
319	Dowding, H.A. ...	Up. Sh.	15-3	60-7 3-2	98-8 13-8	28-7 2-0	21-5 —	11-5 —	7-8 0-1
233	Feetham, O.	Up. iii	15-0	65-2 3-9	100-0 16-5	29-0 1-8	21-2 0-3	11-2 -0-3	7-8 -0-2
474	Ferguson-Davie, H.H. Low. v. 2	15-2	63-5 4-2	115-0 20-2	28-2 1-8	21-5 —	12-5 1-0	12-5 1-0	8-2 0-5
123	Footman, J.	Up. iv	14-10	63-9 3-6	99-0 13-5	28-0 1-8	21-5 0-5	11-0 —	7-3 0-1
191	Fowler, E.S.	Mid. v.	16-5	63-8 5-3	119-8 28-8	26-9 1-9	21-1 0-1	12-0 1-0	8-2 1-0
167	Hadow, G.G.L. ...	Mod. M. 1	15-2	67-2 6-3	131-5 27-5	30-0 3-0	21-0 0-5	12-5 1-3	8-7 1-0
13	Horsburgh, C.W. ...	Up. v	16-2	69-6 6-1	137-0 32-5	30-6 3-1	21-5 0-5	12-8 1-1	8-5 0-5
500	Hort, A.F.	vi	16-9	70-5 5-7	144-5 26-7	31-2 2-3	22-5 —	11-7 -0-3	9-2 0-2
531	Hutton, L.J.	Mid. iv	15-2	63-8 3-5	119-5 23-7	29-5 2-5	22-4 0-2	12-5 1-0	9-0 0-8
308	Jackson, F.A.	Up. Sh.	15-3	70-2 4-9	151-0 25-2	32-5 2-5	22-7 0-2	12-5 0-8	9-5 0-3
538	Kingsbury, W.B. ...	Up. Sh.	16-5	63-8 5-8	159-0 40-7	32-7 3-6	22-3 0-3	14-1 1-1	10-1 1-1
433	Lacelles, O.H. ...	Up. iv.	15-9	65-5 3-7	100-3 12-3	28-0 -0-5	21-8 0-3	11-7 0-7	7-4 0-2
463	Lynn, G.	Mid. v	17-11	70-3 2-8	152-5 45-7	33-5 2-5	22-6 0-1	12-7 0-7	9-8 0-6

Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
416 Manton, H.E.	Mod. L. 1	14-4	59-1	98-9	38-0	21-2	11-0	8-0
59 Martin, D.E.	Up. Sh.	14-2	60-3 4-8	108-0 18-5	29-0 0-5	21-2	12-0 0-8	8-4 0-2
324 Merewether, J.W.B. Mid. iv		13-4	59-0 2-7	98-8 9-8	27-6 1-1	22-0	11-0	8-0 0-3
368 Mounsey, D.J. ...	Mid. iv	15-6	64-0 4-0	125-5 26-0	31-8 3-8	21-7 0-7	13-3 1-8	9-6 1-6
374 Nelson, E.	Up. iv	15-2	64-0 4-7	113-5 30-7	29-0 2-0	21-5	13-6 0-6	8-5 0-5
21 Orlebar, E.H.	Up. v	17-2	66-9 2-6	136-0 16-7	33-0 0-5	21-7	13-5 0-5	9-5 0-5
200 Orr, H.H.	Up. Sh.	15-10	68-0 4-5	118-0 17-2	29-9 1-7	21-5 0-5	12-5 0-5	8-6 0-1
467 Padwick, F.G. ...	Mid. v	15-1	68-2 5-7	155-0 53-2	32-8 4-3	22-0	14-2 0-7	10-1 0-9
268 Peake, A.	Low. iii	13-6	61-0 4-0	98-5 9-5	27-0 0-2	21-5 0-3	10-6 0-1	7-7
509 Porter, H.O.	Mid. iv	15-4	63-4 6-1	114-5 24-5	29-5 3-5	21-2	12-5 0-8	8-3 0-3
298 Pritchard, M.S. ...	Low. v	15-9	62-6 2-8	96-0 10-0	27-5 1-3	20-4 0-1	11-9 0-2	7-5
43 Pryce, H.G.	Up. Sh.	16-2	59-0 1-7	94-5 3-7	30-0 1-5	23-2	11-0 0-3	8-4 0-4
394 Quinton, F.W.D. Up. Sh.		14-10	67-0 6-5	131-8 23-5	30-0 1-5	23-8 0-6	13-5 1-0	8-7 0-5
445 Randolph, G.B. ...	Mod. M. 1	16-0	62-1 4-1	103-8 16-3	26-5 0-2	20-8 0-2	12-0 0-1	7-6 1-0
243 Rendle, A.O.	Up. iv	14-3	58-2 3-7	90-8 8-0	27-6 0-6	21-1 0-1	11-1 0-1	8-5 0-3
235 Rigden, W.A.	Up. iv	16-0	56-3 3-0	77-5 5-7	26-5 1-3	22-0	10-0 0-3	7-5 0-5
450 Rogers, G.P.	Up. Sh.	15-5	66-5 5-0	124-0 26-0	31-5 3-0	21-5 0-3	12-6 0-6	8-5 0-5
495 Scovell, C.T.R. ...	Mod. M. 1	16-4	67-1 2-8	147-5 16-5	32-0 0-5	21-5 0-3	13-5 0-8	10-0 0-5
418 Senior, R.W.	Mid. iv	15-7	62-5 4-2	100-0 15-5	27-7 2-0	20-5	11-5 0-5	7-5 0-3
265 Sharp, W.H.	vi	15-4	62-3 5-5	99-0 24-5	27-2 2-5	21-5 0-5	11-7 1-0	7-8 0-8
189 Smith, C.G.	Mod. U. 2	15-7	60-0 5-0	97-0 21-5	27-9 2-9	21-3 0-2	10-8 0-1	8-3 1-3
395 Stewart, W.B.O. Mod. L. 2		14-10	66-0 4-0	133-5 29-5	32-0 1-8	22-3 0-3	12-0 0-5	9-5 1-5
39 Warren, A.K.	Up. iii	14-6	59-5 4-0	98-5 15-5		21-1 0-1	12-1 0-6	8-0 0-5
149 Woolner, H.	Up. Sh.	14-1	66-2 5-4	130-0 28-0	31-5 3-0	22-5 0-3	12-1 0-9	8-7 0-7

BOYS WEIGHED SEPTEMBER, 1879, AND OCTOBER, 1880.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lb. inc.
246	Allen, J.W.	Up. iv.	15-6	67-6 1-6	144-0 12-0
488	Archer, D.O.	Mod. L. 1	14-8	60-9 2-4	100-0 10-0
268	Barrow, V.E.	Mod. L. 1	14-11	55-9 2-4	96-6 11-0
386	Beale, G.G.	Up. iii	12-4	56-4 0-4	88-0 12-2
396	Bell, H.L.	Up. iv	13-5	56-0 1-0	78-5 3-5
406	Bent, P.S.	Mod. L. 3	13-8	61-5 2-5	98-0 5-7
419	Bere, M.A.	Up. iii	13-11	66-1 3-6	116-0 20-0
241	Bowly, D.	Mod. L. 2	15-0	60-3 2-3	96-0 6-0
145	Bucknall, H.O. ...	Low. iii	14-0	58-1 1-3	98-0 4-0
146	Bucknall, P.E. ...	Low. iii	13-0	56-3 1-8	87-0 5-5
589	Bull, F.E.	Low. v 1	14-0	64-8 3-5	125-5 21-5
548	Carey, E.V.	Up. iv	15-7	66-0 3-7	130-0 23-0
456	Cayley, D.L.A. ...	Mod. L. 1	16-0	61-5 1-0	107-0 7-5
546	Chaine, W.	Up. iv	15-4	67-6 2-1	124-8 8-8
263	Clark, D.M.	Mod. L. 1	15-8	63-4 3-1	113-3 15-8
576	Collins, H.D.	Mod. L. 2	15-5	60-9 2-6	98-5 10-7
302	Crookenden, C.P. ...	Mod. L. 1	15-1	62-3 2-8	106-3 14-3
40	DeJersey, N.S. ...	Up. iii	14-9	66-2 2-3	128-5 8-0
174	Dennis, L.	Mod. M. 2	15-9	63-4 2-6	113-5 11-7
481	Du-Maurier, G.L.B. Mid. iv	15-5	63-2 3-2	110-3 19-3	
289	Fairbairn, A.M. ...	Low. iii	13-10	61-3 1-8	89-8 3-3
25	Fänden, G.C.F.A.S. Mid. iv	14-6	59-8 3-3	103-5 15-0	
20	Fox, L.W.	Low. v 1	15-0	58-5 2-5	99-8 11-8

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.
84	Goodacre, H.G. ...	Mod. M. 2	15-8	68-8 3-8	107-5 14-0
865	Grenfell, W.T. ...	Low. v 2	15-7	64-4 3-4	121-5 14-5
17	Harding, G.V. ...	Mid. v	15-8	68-0 2-0	135-0 12-0
266	Hill, W.A.	Mid. iv	14-8	58-5 1-2	92-5 5-9
267	Hill, T.H.	Low. iii	13-5	56-6 1-3	85-0 5-0
323	Hughes, E.B.A. ...	Up. iii	14-7	61-4 3-4	101-5 16-5
268	Hughes, E.H.	Mod. U. 2	14-7	62-5 2-2	109-5 8-0
100	Johnston, E.A.T.	Low. Sh.	12-5	54-5 1-5	72-5 —
142	Lance, C.H.	Low. iv	14-10	61-1 1-6	94-0 1-5
157	Lane, H.	Mod. M. 2	15-9	62-0 1-6	96-5 7-7
4	Lias, O.R.	Up. Sh.	14-7	59-9 1-6	88-5 4-0
50	Lister, A.H.	Up. Sh.	15-11	67-4 3-6	126-8 17-3
465	Marley, K.R.	Up. iv	15-8	64-0 2-0	131-3 14-3
118	Maturin, C.	Mid. iv	15-3	62-0 2-7	117-0 16-5
290	Manrice, R.B.	Mid. iv	13-2	63-7 2-4	94-5 6-0
140	Nicholson, O.L. ...	Mod. M. 2	14-11	59-0 3-0	92-0 9-0
301	Nicholson, H.F. ...	Mid. iv	14-11	61-0 2-5	97-5 9-0
523	Nowell, R.W.	Mod. M. 1	15-6	67-2 1-7	142-5 14-5
187	Ogbourne, L.O.W.	Up. iii	13-10	53-7 1-2	83-0 3-0
44	Powles, F.J.E. ...	Mid. iv	13-7	57-8 2-0	98-0 7-5
299	Preston, C.S.	Mid. v	15-6	68-5 3-0	133-0 17-0
90	Rawlinson, O.B. ...	Up. iv	14-6	60-9 1-9	106-0 6-0
524	Rendel, L.J.	Mod. M. 1	14-10	67-2 2-7	123-8 16-3
343	Reynolds, B.L. ...	Up. iii	14-2	55-3 1-3	90-0 4-9

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.
413	Richards, E.W. ...	Mid. iv	15-0	56-0-0-3	87-7 7-7
414	Richards, H.B. ...	Low. iii	13-8	55-0 2-0	77-8 3-3
106	Robertson, H.R. ...	Low. v 2	14-4	68-3 1-3	123-5 4-0
498	Robertson, E.	Mid. iv	13-8	65-0 2-0	120-8 15-7
7	Sale, T.R.	Mid. v	15-6	68-3 1-3	115-5 11-0
493	Schilizzi, E.S.	Low. v 1	15-4	63-3 1-7	116-0 8-0
541	Sharpe, H.O.	Up. v	15-3	70-0 3-0	145-0 20-5
435	Soden, A.S.	Mod. M. 2	15-2	59-0 1-3	88-0 7-2
333	Tanner, J.	Low. Sh.	11-10	54-0 1-5	71-8 4-8
34	Tennant, H.S. ...	Mod. M. 2	14-7	63-3 1-3	118-5 13-5
196	Thring, L.O.W. ...	Up. Sh.	14-3	54-1 0-3	73-5 6-0
197	Thruston, A.B. ...	Low. v 1	15-9	59-9 1-6	95-5 5-5
576	Townsend, B.	Mid. iv	15-6	60-3 2-0	143-0 12-5
313	Trethewy, T.L. ...	Mid. iv	13-4	59-2 2-2	89-0 6-0
334	Usabar, B.G.	Low. v 2	13-7	56-2 1-2	83-5 3-2
543	Waterfield, O.F. ...	Low. v 1	15-9	70-4 3-1	150-0 23-5
297	Watson, C.F.	Mod. L. 2	14-11	64-1 3-8	130-5 23-7
431	Weston, W.K.	Mid. iv	15-9	60-7 2-4	119-0 16-0
298	White, H.C.M.	Mod. M. 1	15-1	65-8 2-5	134-0 18-0
120	White, A.W.	Low. iv	13-2	57-0 2-0	87-0 8-0
475	Williams, B.O.W.	Mod. M. 1	15-5	65-5 3-0	126-8 19-8
551	Wilson, J.S.	Up. Sh.	15-11	63-5 3-5	108-0 15-0
516	Wilson, H.G.	Up. iv	14-6	61-0 2-0	91-0 4-7
151	Woolner, G.	Mid. iv	13-10	60-0 4-0	120-0 14-5

BOYS ENTERED SEPTEMBER, 1880.

No.	Name.	Form.	House.	Born.	Age.		Height.	Weight.	Chest.	Circumference of			Place of Birth.
					Years.	Da.				Head.	Leg.	Arm.	
597	Alexandroff, N. ...	Up. iv	F.E.T.	Jan. 2, 66—14-9	64-5	133-0	29-7	21-5	13-5	8-3			Manchester
396	Aiston, J.E.	Mid. iv	T.A.P.	July 18, 66—14-3	60-0	89-5	26-8	20-5	10-3	7-2			Beckley, Kent
331	Black, G.S.	Up. iv	H.B.H.	Dec. 27, 65—14-10	60-5	97-0	28-0	20-3	11-9	7-8			Warwickshire
276	Badcock, E.B.	Low. iv	T.A.P.	Jan. 2, 66—14-9	59-8	91-5	26-5	21-3	11-5	7-7			Yorkshire
535	Balk, C.	Mod. L. 2	W.E.M.	Oct. 30, 66—13-11	55-6	88-0	25-7	21-0	10-7	7-5			Sheffield
580	Beynon, W.G.L. ...	Mod. L. 2	J.B.G.	Nov. 5, 66—13-11	59-6	91-0	26-8	21-2	11-5	7-3			Agra, N.W.P.
476	Biscoe, R.E.	Low. Sh.	W.F.	Dec. 25, 67—12-10	57-0	86-0	26-0	20-4	11-3	7-0			Westmeath
532	Browne, A.E.	Mod. M. 2	W.E.M.	Mar. 10, 66—14-7	63-6	106-0	27-9	20-4	11-5	7-5			Peckham Eye
528	Cairnes, H.M.	Mod. L. 2	W.E.M.	Feb. 19, 68—12-8	62-2	89-5	27-0	21-6	11-1	7-2			Pan
80	Capell, A.A.	Low. v 2	J.B.G.	June 27, 64—16-3	67-2	132-0	22-0	21-7	14-6	11-5			Watford
549	Chaine, J.	Mid. iv	J.B.G.	Dec. 25, 66—13-10	61-2	102-5	28-4	21-5	11-6	7-3			Antrim
269	Child, A.G.	Mid. iv	L.E.U.	Dec. 4, 66—13-10	59-1	75-5	25-6	20-0	11-0	7-3			Gloucester
596	Cloves, W.A.	Mod. L. 2	F.E.T.	Dec. 28, 66—13-10	57-3	81-5	26-0	21-5	11-0	7-4			Surrey
597	Cochrane, A.E. ...	Up. iv	W.E.M.	Oct. 1, 66—14-0	65-4	128-0	29-8	21-6	12-5	8-5			Calcutta
600	Curtis, G.S.	Low. v 2	F.E.T.	June 67—13-4	60-1	81-3	26-3	21-1	10-9	7-0			Hants
67	Daunt, A.	Up. iii	R.A.	Jan. 67—13-9	63-0	104-0	29-0	21-4	11-7	7-7			Cork
114	DeJersey, B.H. ...	Low. Sh.	T.A.P.	Ap. 11, 66—12-6	59-6	81-3	24-5	21-0	9-3	6-6			Guernsey
269	D'Urban, H.L. ...	Low. v 2	J.B.G.	Jan. 31, 66—14-8	66-9	130-0	30-7	21-2	12-5	9-0			Devon
86	Dolphin, H.B.	H	R.A.	Ap. 12, 68—12-6	60-3	92-3	27-0	21-0	10-8	7-5			Nottinghamshire
38	Dundas, R.N.	Up. Sh.	M.H.G.	Jan. 14, 67—13-9	63-4	121-0	29-0	22-0	13-0	8-5			Essex
176	Forrester, G.B. ...	Mod. L. 1	J.P.W.	May 5, 66—14-5	63-0	107-0	31-0	21-5	13-0	8-9			Cornwall

No.	Name.	Form.	House.	Born.	Age. Years.	Height. in.	Weight. lbs.	Circumference of				Place of Birth.
								Head.	Chest.	Leg.	Arm.	
						in.		in.	in.	in.	in.	
370	Freeland, L.G. ...	Low. Sh.	R.A.	Ap. 67-13-6	54-6	74-3	25-5	20-2	29-8	9-8	6-7	London
371	Freeland, A.D. ...	Low. Sh.	R.A.	Ap. 68-13-6	51-6	64-0	23-8	20-4	29-0	9-0	6-5	London
434	George, E.S.	Low. iv	R.A.	Nov. 27, 67-12-11	58-6	99-0	27-0	21-0	11-6	8-5	7-5	Surrey
409	Griffith, T.F.	Low. iv	T.A.P.	June 27, 67-13-4	59-7	93-0	26-0	20-5	11-1	7-5	7-5	Kent
297	Hamerton, L.O. ...	Up. iii	R.A.	Jan. 30, 67-13-8	61-8	108-5	28-7	20-0	12-3	8-0	8-0	Warwickshire
79	Harrison, D.H.A.C.	Mod. L. 2	J.P.W.	Feb. 17, 66-14-8	62-7	108-0	27-7	21-7	11-4	8-0	8-0	Kent
508	Hayward, J.A. ...	Mid. iv (a)	W.E.M.	Ap. 7, 66-14-6	60-5	96-5	27-0	20-7	12-0	8-2	8-2	Wilt
599	Herbert, E.C.	Mid. iv	F.E.T.	Sept. 2, 65-15-1	56-8	87-8	26-0	21-2	11-5	7-7	7-7	Measee, India
43	Jackson, A.B. ...	Low. iv	R.A.	Mar. 26, 68-12-7	54-9	72-5	26-8	20-0	9-4	6-5	6-5	London
377	Kekawich, H.H. ...	Low. iv	H.B.H.	Oct. 10, 66-14-0	61-5	108-0	32-0	22-0	12-7	9-8	9-8	Warwickshire
451	Macaulay, P.J.F.	Mid. iv	W.M.	Jan. 1, 67-13-9	62-5	107-3	27-8	21-5	12-0	7-5	7-5	Umballa, Punjab
314	Macpherson, A.H.	Low. iv	G.S.	Jan. 4, 67-13-9	56-1	72-5	23-8	20-1	10-4	6-4	6-4	Calcutta
384	Mahaffy, A.W. ...	Low. Sh.	R.A.	Oct. 22, 69-11-0	57-0	84-5	25-7	21-6	10-3	7-3	7-3	Dublin
120	Marsh, N.N.	Low. Sh.	R.A.	Jan. 11, 68-12-9	55-5	90-5	27-0	20-6	12-5	7-7	7-7	Notts
588	Martelli, W.G. ...	Mod. L. 2	W.E.M.	Sept. 30, 65-15-0	64-0	121-8	31-0	22-7	13-5	9-4	9-4	Dublin
598	Mavrogordato, S.J.	Low. iv	F.E.T.	May 11, 66-14-5	60-5	101-5	27-6	20-8	11-0	8-0	8-0	Liverpool
208	Meyrick-Jones, F.	Mid. iv (a)	J.P.W.	Jan. 14, 67-13-9	59-4	98-5	28-6	20-5	11-9	8-0	8-0	Blackheath
335	Molony, J.R.H. ...	Low. iv	G.S.	Ap. 28, 67-13-6	57-1	83-5	25-5	20-5	10-5	7-2	7-2	London
512	Neate, R.M.	Mod. L. 2	W.E.M.	Feb. 18, 67-13-8	63-8	117-5	27-9	21-1	13-0	8-6	8-6	Hampstead
585	Nicholson, R.E. ...	Low. iii	H.B.	May 20, 67-13-5	59-8	93-0	26-5	21-0	11-0	7-7	7-7	Hull
16	Olivier, H.E.	Up. Sh.	W.J.V.B.	Feb. 16, 66-14-8	56-8	83-0	26-0	21-4	11-0	8-1	8-1	Wilt
536	O'Neill, E.A.	Low. iv	J.B.G.	Nov. 9, 66-13-11	63-0	115-5	29-3	21-3	12-0	8-1	8-1	Devon
595	Ord, R.W.	Mid. iv	F.E.T.	Sept. 7, 67-13-1	53-3	81-3	26-0	20-4	10-7	7-0	7-0	Streatham, S.W.
438	Palmer, C.S.	ii	W.M.	Dec. 29, 68-11-10	52-1	70-8	25-0	20-8	10-1	7-0	7-0	Kilburn

No.	Name.	Form.	House.	Born	Age. Years.	Height. in.	Weight. lbs.	Circumference of			Place of Birth.
								Head.	Chest.	Arm.	
						in.	lbs.	in.	in.	in.	
403	Phillips, P.C.	ii	T.A.P.	Aug. 29, 68—12-2	51-8	67-0	24-4	19-4	10-0	6-6	Herts
95	Pictard-Cambridge, F.A. Up. iii		R.A.	Oct. 10, 68—11-9	59-5	85-8	26-0	21-4	10-5	6-5	Dorset
298	Preston, H.S.	Up. Sh.	G.S.	Aug. 5, 66—14-2	64-4	116-3	31-7	22-2	11-8	8-3	Westbourne Park
349	Roberts, R.C.	Low. iv	J.P.W.	Sept. 15, 66—14-1	60-0	106-5	28-7	20-4	11-7	8-3	Denbighshire
119	Robinson, J.	Low. iv	L.E.U.	Nov. 20, 65—14-11	63-2	119-0	29-6	21-0	12-5	9-2	Cambridgeshire
537	Sheppard, E.B. ...	Up. iv	W.E.M.	Ap. 14, 66—14-6	55-8	85-0	26-7	21-2	10-6	7-6	Surrey
281	Stanton, H.L. ...	Mid. iv	R.A.	Nov. 21, 67—12-11	60-1	105-0	29-2	21-3	11-7	8-3	Barretpore
105	Streetfeld, G.H.M.	Low. iii	R.A.	Nov. 19, 67—12-11	55-7	86-8	26-8	21-1	11-3	7-3	Northumberland
278	Walker, V.C.	Mid. iv	H.B.H.	Dec. 6, 65—14-10	64-3	118-5	29-5	21-0	11-7	8-2	Staffordshire
503	Webb-Ware, F.C.	Up. iii	W.E.M.	Nov. 10, 66—13-11	63-1	129-0	28-8	21-0	13-0	8-4	Australia
186	Weatherhead, A.S.	Up. iv	G.S.	May 2, 66—14-5	55-4	76-0	25-5	20-5	10-5	7-3	Bombay
27	Wynne-Willson, A.B. Up. iv		G.S.	Mar. 30, 67—13-6	59-1	93-8	26-3	21-0	11-5	7-7	Surrey
202	Wood, E.B.	Mod. L. 1	R.A.	Feb. 21, 68—12-8	61-8	92-0	26-0	20-1	10-7	7-2	Wilts
562	Wright, J.C.	Low. iv	J.B.G.	Oct. 5, 66—14-0	58-4	86-0	27-8	20-8	11-0	7-0	Yorkshire
354	Yale, T.P.O.	Mod. L. 2	R.A.	Mar. 24, 68—12-7	58-8	94-8	29-8	22-5	11-9	9-0	Denbighshire
422	Young, G.J.	Up. Sh.	W.M.	Feb. 14, 66—14-8	62-2	105-3	27-6	21-4	11-4	8-2	S. Australia

STATEMENT OF ACCOUNTS FOR 1880.

RECEIPTS.

	£	s.	d.
Balance from last Account	...	63	4 3
Subscriptions—Common Room...	...	10	11 0
Ditto School	...	15	2 0
Donations...	...	0	15 0
Ditto, Rev. J. Papillon	...	2	2 0
Sale of Reports and Plates	...	21	6 4
Sale of Maps, Antiquities, Catalogues, &c.	...	10	19 3
Sale of Almanacs...	...	3	2 6
For Field Days	...	22	11 0
Tax	...	42	17 2

£192 10 6

EXPENDITURE.

	£	s.	d.
Subscription to Wilks Archaeological	...	0	10 6
To Report...	...	51	10 0
„ Field Days	...	22	12 0
„ Papers, Binding, Stationery, &c.	...	10	15 4
„ Cabinet Work, &c.	...	27	11 10
„ Printing Catalogues, &c.	...	18	15 3
„ Gregory for arranging Collections	...	9	12 0
„ Bird-stuffing	...	1	0 0
„ Repairing Microscope	...	0	5 0
„ Carriage of Parcels, &c.	...	1	2 5
„ Ironwork	...	0	17 0
Balance	...	47	19 2

£192 10 6

N.B.—Of the balance of £47 19s. 2d, nearly the whole is due for expenses of the present Report.

J. P. WAY,
Treasurer.

No.	Name.	Form.	House.	Born.	Age. Years.	Height. in.	Weight. lbs.	Circumference of			Place of Birth.	
								Chest.	Head.	Leg.		
								in.	in.	in.		
370	Freeland, L.G. ...	Low. Sh.	R.A.	Ap.	67-13-6	54-6	74-3	25-5	20-2	9-8	6-7	London
371	Freeland, A.D. ...	Low. Sh.	R.A.	Ap.	63-13-6	51-6	64-0	23-8	20-4	9-0	6-5	London
494	George, E.S.	Low. iv	R.A.	Nov. 27, 67-12-11	58-6	58-6	99-0	27-0	21-0	11-6	8-5	Surrey
409	Griffith, T.F.	Low. iv	T.A.P.	June 27, 67-13-4	59-7	59-7	98-0	26-0	20-5	11-1	7-5	Kent
297	Hamerton, L.O. ...	Up. iii	R.A.	Jan. 30, 67-13-8	61-8	61-8	106-5	28-7	20-0	12-3	8-0	Warwickshire
79	Harrison, D.H.A.C.	Mod. L. 2	J.P.W.	Feb. 17, 66-14-8	62-7	62-7	108-0	27-7	21-7	11-4	8-0	Kent
508	Hayward, J.A. ...	Mid. iv (a)	W.E.M.	Ap. 7, 66-14-6	60-5	60-5	96-5	27-0	20-7	12-0	8-2	Wilts
599	Herbert, E.C.	Mid. iv	F.E.T.	Sept. 2, 65-15-1	56-8	56-8	87-8	26-0	21-2	11-5	7-7	Meane, India
43	Jackson, A.B. ...	Low. iv	R.A.	Mar. 26, 68-12-7	54-9	54-9	72-5	26-8	20-0	9-4	6-5	London
377	Kekewich, H.H. ...	Low. iv	H.B.H.	Oct. 10, 66-14-0	61-5	61-5	108-0	32-0	22-0	12-7	9-8	Warwickshire
451	Maceulay, P.J.F.	Mid. iv	W.M.	Jan. 1, 67-13-9	62-5	62-5	107-3	27-8	21-5	12-0	7-5	Umballa, Punjab
314	Macpherson, A.H.	Low. iv	G.S.	Jan. 4, 67-13-9	66-1	66-1	72-5	23-8	20-1	10-4	6-4	Calcutta
384	Mahaffy, A.W. ...	Low. Sh.	R.A.	Oct. 22, 69-11-0	57-0	57-0	84-5	25-7	21-8	10-3	7-3	Dublin
120	Marsh, N.N.	Low. Sh.	R.A.	Jan. 11, 63-12-9	55-5	55-5	90-5	27-0	20-8	12-5	7-7	Notts
536	Martelli, W.G. ...	Mod. L. 2	W.E.M.	Sept. 30, 65-15-0	61-0	61-0	121-8	31-0	22-7	13-5	9-4	Dublin
598	Marzorgodato, S.J.	Low. iv	F.E.T.	May 11, 66-14-5	60-3	60-3	101-5	27-6	20-8	11-0	8-0	Liverpool
208	Meyrick-Jones, F.	Mid. iv (a)	J.P.W.	Jan. 14, 67-13-9	69-4	69-4	98-5	28-6	20-5	11-9	8-0	Blackheath
335	Molony, J.R.H. ...	Low. iv	G.S.	Ap. 23, 67-13-6	57-1	57-1	83-5	25-5	20-5	10-5	7-2	London
512	Neake, R.M.	Mod. L. 2	W.E.M.	Feb. 18, 67-13-8	63-8	63-8	117-5	27-9	21-1	13-0	8-6	Hampstead
585	Nicholson, R.E. ...	Low. iii	H.B.	May 20, 67-13-5	59-8	59-8	95-0	26-5	21-0	11-0	7-7	Hull
16	Olivier, H.E.	Up. Sh.	W.J.V.B.	Feb. 16, 66-14-8	56-8	56-8	83-0	26-0	21-4	11-0	8-1	Wilts
556	O'Neill, E.A.	Low. iv	J.B.G.	Nov. 9, 66-13-11	63-0	63-0	115-5	29-8	21-3	12-0	8-1	Devon
595	Ord, R.W.	Mid. iv	F.E.T.	Sept. 7, 67-13-1	56-3	56-3	81-8	26-0	20-4	10-7	7-0	Stresham, S.W.
438	Palmer, C.S.	ii	W.M.	Dec. 29, 68-11-10	52-1	52-1	70-8	25-0	20-8	10-1	7-0	Kilburna

No.	Name.	Form.	House.	Born	Age. Years.	Height. in.	Weight. lbs.	Circumference of			Place of Birth.
								Head.	Chest.	Arm.	
								in.	in.	in.	
403	Phillips, P.C.	ii	T.A.P.	Aug. 39, 68—12-2	51-8	67-0	24-4	19-4	10-0	6-6	Herts
95	Piotard-Cambridge, F.A. Up. iii		E.A.	Oct. 10, 68—11-9	59-5	85-8	26-0	21-4	10-5	6-5	Dorset
298	Preston, H.S.	Up. Sh.	G.S.	Aug. 5, 66—14-2	64-4	116-3	31-7	22-2	11-8	8-3	Westbourne Park
349	Roberts, B.C.	Low. iv	J.P.W.	Sept. 15, 66—14-1	60-0	106-5	28-7	20-4	11-7	8-3	Denbighshire
119	Robinson, J.	Low. iv	L.E.U.	Nov. 20, 65—14-11	63-2	119-0	29-6	21-0	12-5	9-2	Cambridgeshire
587	Sheppard, E.B. ...	Up. iv	W.E.M.	Ap. 14, 66—14-6	55-8	86-0	26-7	21-2	10-6	7-6	Surrey
281	Stanton, H.L. ...	Mid. iv	E.A.	Nov. 21, 67—12-11	60-1	105-0	29-2	21-2	11-7	8-3	Barrackpore
105	Streatfeild, G.H.M. Low. iii		E.A.	Nov. 19, 67—12-11	55-7	86-8	26-8	21-1	11-2	7-3	Northumberland
273	Walker, V.C.	Mid. iv	H.B.H.	Dec. 6, 65—14-10	64-3	118-5	29-5	21-0	11-7	8-2	Staffordshire
503	Webb-Ware, F.C. Up. iii		W.E.M.	Nov. 10, 66—13-11	68-1	129-0	28-3	21-0	13-0	8-4	Australia
186	Weatherhead, A.S. Up. iv		G.S.	May 2, 66—14-5	55-4	76-0	25-5	20-5	10-5	7-2	Bombay
27	Wynne-Willson, A.B. Up. iv		G.S.	Mar. 30, 67—13-6	59-1	93-8	26-3	21-0	11-5	7-7	Surrey
202	Wood, E.B.	Mod. L. 1	E.A.	Feb. 21, 68—12-8	61-8	92-0	26-0	20-1	10-7	7-2	Wilts
562	Wright, J.C.	Low. iv	J.B.G.	Oct. 5, 66—14-0	58-4	86-0	27-8	20-8	11-0	7-0	Yorkshire
354	Yale, T.P.O.	Mod. L. 2	E.A.	Mar. 24, 68—12-7	58-8	94-8	29-8	22-5	11-9	9-0	Denbighshire
422	Young, G.J.	Up. Sh.	W.M.	Feb. 14, 66—14-8	62-2	105-3	27-3	21-4	11-4	8-2	S. Australia

STATEMENT OF ACCOUNTS FOR 1880.

RECEIPTS.		EXPENDITURE.	
	£ s. d.		£ s. d.
Balance from last Account ...	... 63 4 3	Subscription to Wilks Archaeological ...	... 0 10 6
Subscriptions—Common Room...	... 10 11 0	To Report... ..	... 51 10 0
Ditto School ...	... 15 2 0	Field Days	... 22 12 0
Donations	... 0 15 0	Papers, Binding, Stationery, &c. ...	... 10 15 4
Ditto, Rev. J. Papillon ...	... 2 2 0	Cabinet Work, &c.	... 27 11 10
Sale of Reports and Plates ...	... 21 6 4	Printing Catalogues, &c.	... 18 16 3
Sale of Maps, Antiquities, Catalogues, &c. ...	... 10 19 3	Gregory for arranging Collections..	... 9 12 0
Sale of Almanacs	... 3 2 6	Bird-stuffing	... 1 0 0
For Field Days	... 22 11 0	Repairing Microscope	... 0 5 0
Tax	... 42 17 2	Carriage of Parcels, &c.	... 1 2 5
		Ironwork	... 0 17 0
		Balance	... 47 19 2
	<u>£192 10 6</u>		<u>£192 10 6</u>

N.B.—Of the balance of £47 19s. 2d., nearly the whole is due for expenses of the present Report.

J. P. WAY,
Treasurer.



F. Madan
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REPORT
OF THE
MARLBOROUGH COLLEGE
Natural History Society,
(FOUNDED APRIL 9th, 1864),
FOR THE
YEAR ENDING CHRISTMAS, 1881.

No. 30.



"TUM MIHI NATURÆ LIBEAT PERDISCERE MORES:
QUIS DEUS HANC MUNDI TEMPERET ARTE DOMUM."

MARLBOROUGH:
PRINTED BY C. PERKINS AND SON,
1882.

Hauborough

Mar 5th 1881

May 4th 1.

My dear Madam

£1 sent Mar. 10. 1881
for 3 future 3 years
from after 1st become.

10th sent Feb. - Mar. 1882 so I
we have recently reduced the Subscription
and clear till May 1883 at least
of 100 members of the N. H. S. & £1. 10. 0
as I write on postage & 10. 0
will entitle the subscriber to receive the
on Mar. 11. 1882.

Reports for 6 years with the option
of course of renewing at the end of the
term of years. If this interests you, I shall
be very glad to see that the
Reports come regularly to you.

Will you accept as a small contribution
to the Marlborough Library the
accompanying list of xi. s. &c.
I published it a few months ago
in the hope that it might bring
just to the mill of our Society—
but somehow or other it has not
gone off fitly. I think it must
be a good deal from want of
being known. for we charge but
1/6^d - by O.K. sending 7 stamps

Mailborough

Mar 5th 1881

The spirit will be sent me by return
of post.

Things flourish - and we live in
hope of seeing an altar in
a more spacious room.

Sincerely yours

H. Rutland.

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REPORT

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P R E F A C E .

A GLANCE at the Preface of our last Report will show why the year 1880 was a critical one in the history of the Society. It is therefore with all the greater satisfaction that the Committee feel themselves entitled to record that the year 1881 has been one of distinct progress.

The suggestion that the increased interest taken in the subjects which the Society professes to encourage called for more systematic instruction than had of late been accessible, has borne good fruit. Sections have been formed, and have been worked with some success. The Botanical Section, under the presidency of the Rev. T. A. PRESTON, held weekly meetings during the Easter and Summer Terms, and will we may hope be renewed now. The Entomological Section, under Mr. HART-SMITH, held fortnightly meetings during the same period, and will recommence operations in March. The Ornithological Section, under the Rev. J. P. WAX, met every fortnight during the Summer term, and in the Winter term some useful lessons were given in skinning birds, which have produced satisfactory results. The acquisition of an admirable telescope at once led to the formation of an Astronomical Section, under Mr. RODWELL and Mr. UPCORR, and a series of lectures were given by H. L. CALLENDAR, which as the season becomes more propitious will be supplemented by the more regular use of the instrument itself. That four sections should have been formed in a single year, and

Sections.

should have flourished, says something for the life of the Society. Independently of these officially recognized channels of instruction, a select few have derived great pleasure and profit from working with the Microscope privately with Mr. HART-SMITH.

But although the sectional work tells of growing interest, it must be remembered that a great deal more than mere interest is required if the standard reached of late years by the winners of the Stanton Prizes is to be maintained. After our three leading Entomologists there comes a great gap, which nothing but hard and regular work this year will enable us to bridge over.

**Stanton
Prizes.**

The Committee had hoped that the formation of the sections would have produced a larger competition for the Stanton Prizes. In this they were disappointed. The well-known excellence of one of the competitors for the Entomological prize made the result a foregone conclusion, but if there is reason to regret that only one collection was shewn up, the excellence of that one collection made by W. F. H. BLANDFORD was enough in itself to redeem this branch of our work from discredit. The Botanical Prize being a more open question produced three collections of fair merit: and the promise of a more spirited contest in both departments in the coming year proves that the sectional work has told. That our efforts are appreciated in the quarters where we look for approbation is evidenced by the offer of a third prize this year for Geology, the study of which is rendered more interesting now by the opening of the new Railway to Swindon.

**Museum
Prize.**

A prize newly constituted for the paper that showed the fullest knowledge of the varied contents of the Museum produced strikingly good results from J. S. WILSON, who won the prize, E. K. CHAMBERS, H. G. GOODACRE, and H. W. CHOLMELEY.

Meetings

The numbers of the Society still continue very high, and so great has been the demand for admission to the lectures that it has

been found necessary to transfer the place of meeting from the Museum to the Bradleian, which, on the occasion of Dr. Fergus' paper, received nearly 300 within its walls. The success of these meetings is due to the continued kindness of many true friends to the Society and to the School, to whom we feel that our heartiest thanks are due.

A new feature in our fortnightly meetings has been the appearance of the Rev. J. G. Wood, who delighted twice over an unusually large audience with his famous sketch lectures, and moreover contributed a valuable paper on School Museums to the *Marlburian*.

Our list of donations last year was a handsome one: 1881 has surpassed it. First and foremost we owe a very deep debt of gratitude to a generous supporter of our work, who desires that his name may not transpire, for the present of a magnificent telescope. We hope that he feels some return for his goodness in the knowledge of the way in which his gift is appreciated, and of the great work which it seems likely to do. Again the Rev. G. W. DE LISLE has most liberally supplied a want, which we and the Art Society have long felt, in the very handsome present of a first-rate magic lantern with everything complete. It puts within our reach much to which we have not been able hitherto to attain, and marks a distinct epoch in our history. During this last year the large barometer, given to the School by the MASTER, has been set up in the portico of C House, and the readings regularly recorded by W. J. CALLENDAR have been a source of daily interest to many. Amongst many other proofs of interest in our efforts, of which the list of donations in this Report gives evidence, we would call especial attention to a large collection of objects from Ceylon, from H. C. BERWICK, to collections of fossils from the Rev. G. BURMESTER and W. COLCHESTER, Esq., and to the promise already in part fulfilled of E. F. IM THURN, Esq., O.M., to supply us with an ethnographical collection of objects

Donations.

from British Guiana. We have also recently been put upon the list of societies entitled to receive donations from the British Museum.

**New
Museum.**

The steadily increasing kindness of friends has for some time past rendered the existing Museum too narrow a home for our possessions; and it is with the greatest satisfaction that we are able to state that a new Museum will in the space of a few months be in course of construction.

The Report.

We would call special attention to the accompanying Report. It contains an unusually large amount of matter, and we venture to believe of valuable matter. We have reason to know that the statistics so laboriously collected here are much thought of by distinguished men, who can appreciate their worth. To the ordinary tables of Weights and Measures are now added for the first time some remarkable facts connected with the eyes and eye-sight of the School. The papers which we have printed are we believe above the average in merit and interest, and have moreover been made more intelligible and attractive by well-executed diagrams, of which we trust our subscribers will approve, and for which our thanks are due to the Rev. W. J. V. BAKER and F. E. HULME, Esq.

**Revision of
Rules.**

The Committee have revised the Rules of the Society, and amongst minor alterations have made one in relation to Honorary Members, which they hope will give satisfaction to existing members: and enable more to remain in closer connection with the Society.

**Map of the
Downs.**

It will be gratifying to many besides ourselves to know that the large map of the Wiltshire Downs by the Rev. A. C. SMITH, of Yatesbury, will shortly be in the publishers' hands, and may be looked for in about 6 months.

Signed, on behalf of the Committee:

H. RICHARDSON,
President.

CHRISTMAS, 1881.

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J. F. Duthie, Esq.	J. B. Fuller, Esq.
G. H. Dawson, Esq.	H. E. Garrod, Esq.
Rev. A. C. Almack	T. O. Harding, Esq.
E. F. Tim Thurn, Esq.	Rev. The Master
Rev. G. W. de Lisle	W. W. Goodchild, Esq.
H. A. Evans, Esq.	L. E. Upcott, Esq.
Rev. J. W. Mills	W. M. H. Milner, Esq.
W. W. Fowler, Esq.	T. N. Hart-Smith, Esq.
C. Sankey, Esq.	Rev. J. P. Way
A. H. Beesly, Esq.	H. Richardson, Esq.
F. E. Hulme, Esq.	F. S. Hewson, Esq.
Rev. C. E. Thorpe	Rev. C. W. Taylor
Rev. J. S. Thomas	Rev. J. Papillon
Canon Farrar, D.D., [F.R.S.	H. B. Horner, Esq.
W. P. Sellick, Esq.	G. Sharp, Esq.
H. C. Spry, Esq.	G. W. Rundall, Esq.
G. F. Rodwell, Esq.	R. Alford, Esq.
W. D. Fenning, Esq.	F. Madan, Esq.

EXTRACT FROM RULES.

That Honorary Members pay 5s. a half-year, for which they shall be entitled to a copy of the Report.

That Honorary Members may compound for all future subscriptions by the payment of Three Guineas, and that past members of the Society may compound for six years on payment of £1, to be renewed at will.

R U L E S .

I. That this Society be called the Marlborough College Natural History Society.

CONSTITUTION.

That the Society consist of Members and Honorary Members.

OFFICERS.

That the Officers of the Society consist of a President, Secretary, Treasurer, Librarian, and Curator.

ELECTION OF OFFICERS.

1. That the President have the absolute power of nominating the Secretary.

2. That Common Room members of Committee, who are not ex-officio members, be elected triennially at the commencement of the Winter Term, and that the retiring members be eligible for re-election. Candidates for the Committee from the School must be nominated by the Committee, and elected at the end of the term when the vacancy occurs.

3. That the Librarian and Curator be elected terminally by the Committee.

MANAGEMENT.

That the affairs of the Society be conducted by a Committee consisting of the President, Secretary, Treasurer, and four other members of the Society, two of whom, at least shall be members of the School, to be elected from and by members of the Society; three of whom shall form a quorum.

PRESIDENT.

That in case of an equality of votes, the President shall have a double or casting vote.

SECRETARY.

That the duty of the Secretary be to summon meetings (when necessary) of the Society; to keep a detailed report of the proceedings, as well as lists of Members and Visitors present at each meeting, and generally to act under the direction of the Committee in all matters connected with the welfare of the Society.

LIBRARIAN.

That the duties of the Librarian be to keep a Catalogue of the Library, with the names of the donors, and to see that the Library Regulations are carried into effect.

CURATOR.

That the Curator be responsible for the order and tidiness of the Museum.

LIBRARY.

That any member of the Society be at liberty to consult any of the books belonging to the Society, but that certain volumes to be decided on by the Committee be not allowed to be taken from the room.

MUSEUM.

That only certain members be allowed access to the Museum at all times when the room is not used for school purposes. Application for this privilege must be made to the President.

FIELD DAYS.

That the Field Days be confined entirely to members of the Society, and that the President appoint a day on which all names must be given in.

MEMBERS.

That the election of new members rest entirely with the President.

That every member pay a subscription of 2s. 6d. his first term and 1s. every subsequent term.

That members have the right to introduce one visitor at all general meetings of the Society.

This rule does not apply to the President and Secretary.

HONORARY MEMBERS.

That honorary members pay 5s. a half-year, for which they shall be entitled to a copy of the Report.

That honorary members may compound for all future subscriptions by the payment of three guineas, and that past members of the Society may compound for 6 years on payment of £1, to be renewed at will.

SUSPENSION OF MEMBERS.

That any member be liable to be excluded from the Society by the Committee, if in their opinion, he shall have failed to show sufficient energy in the work of the Society.

SECTIONS.

That the Society be divided into sections to be formed for the more accurate study of the different branches of Natural History.

That the question of the number of sections be left open for settlement at the beginning of every Term.

Attendance at the sections is compulsory, unless an adequate reason can be given for exemption.

Attendance at the sections excuses attendance at the general meetings.

NEW RULES.

That any member of the Society have power to propose any new rule or any alteration in an old one for the consideration of the Committee, provided the motion be seconded by another member.

Two weeks notice must be given of any change proposed.

FIELD DAYS.

TUESDAY, MAY 10TH, NEW MILL.

On this day the Botanical Section, 12 in number, made their first excursion of the year under the guidance of Mr. Preston to the Martinsell district, driving to the Water Meadows at New Mill, with halts at likely spots *en route*, and then proceeding on foot by the canal to the bridge near Pewsey, where the carriage was rejoined. Some good work was done, notably by Chambers, the brothers Rickards, and Badcock, and the number of observations reached the handsome total of 146, including 39 first notices.

SATURDAY, MAY 28TH, CHISELDON.

Forty-one members drove over, and seven arrived later on bicycles. The day was thundery and thick, but the village, in spite of the intrusion of the new railway, was looking its prettiest, and the pleasure of the visit was greatly increased by the hospitable welcome of the Rev. T. Rolph and Mrs. Rolph, who granted us the use of their lawn for meals, and gave us the run of their charming garden.

The ornithologists found some likely spots in the Burderop woods, and secured amongst other things a cuckoo's egg from a robin's nest and a long-eared owl's egg.

The geologists, under the able guidance of Mr. Mullins, paid an interesting visit to the junction of the chalk and greensand laid open by the new railway cutting, and besides the fossils on the spot they found a large number which had been brought up from the Portland beds, near Swindon, to form the permanent way.

For the botanists the locality was not favourable, as in spite of several hard workers, only 126 observations were made, including however one entirely new plant, "*Nardus stricta*," found by R. W. Rickards, and one that is comparatively rare, "*Cineraria campestris*," found by A. E. Aldworth on the top of Liddington Camp.

Considering the drawbacks of season, locality, and weather, the Entomologists had a successful day. About a dozen notices were obtained, and a great many beetles.

SATURDAY, JUNE 18TH, STYPE PARK.

This Field Day produced better results than any we had secured before. The Ornithological Section, in spite of the advanced period of the season, made some interesting observations; while the Botanical section discovered no less than 226 plants in flower, including the Spiked Star of Bethlehem (*Ornithogalum Pyrenaicum*) which was growing in abundance. The Entomologists worked with a will, and as the locality was favourable, some good specimens were taken, the chief catch being a Lobster Moth (*Stauropus Fagi*), which fell to Acton.

The number of members again reached the limit, 40.

SATURDAY, JULY 2ND, MARTINSELL.

A general Field Day, with full numbers, was devoted to the Martinsell district. The Botanists, starting from the Firs, walked through the large covers below, then over the hill at the back of Rainscombe to the top of Oare hill, and could account for 231 notices, including the Bee Orchis, and several new localities; a good performance considering the absence of water meadows. The Entomologists were able to do little.

THURSDAY, JULY 7TH, BLACK BURNET BOTTOM AND AXFORD.

This was only a small Field Day, but quite the most successful of the year. The Botanists numbered 250 notices, and added one flower, which is entirely new, to our lists, and two others which have not been observed for several years. For the Entomologists too the district was found to be very productive, and well worthy of attention next year.

MEETINGS.—LENT TERM.

THURSDAY, JAN. 27TH. PRELIMINARY.

The President in the Chair.

Definite shape was given to a proposal made by a leading member of the society, with a view to secure more systematic work, and some instruction in some of the more popular branches of Natural History, and a Botanical and Entomological section were formed under the guidance of Mr. Preston and E. N. Gardiner, and of Mr. Hart-Smith and P. H. Maddock respectively. The former undertaking to meet every Saturday during Preparation, and the latter on alternate Tuesdays after evening chapel.

THURSDAY, FEBRUARY 3RD.

The President in the Chair.

A paper was read by H. D. DRURY, Esq., on

THE LIFE AND WORK OF MICHAEL FARADAY,

for which the thanks of the meeting were tendered to him by Dr. Fergus, who had himself followed a course of Faraday's famous lectures.

Present, members, 44; school visitors, 8; Common Room and friends,

4. Total, 56.

THURSDAY, FEBRUARY 17TH.

The Rev. J. P. Way in the Chair.

The PRESIDENT gave a lecture on

DEVELOPMENT IN ARMS AND ARMOUR,

the result mainly of a visit to the Anthropological collection of General Pitt Rivers at South Kensington; selecting for illustration the growth of the shield, helmet, bow, javelin, and boomerang. A large number of savage weapons were kindly lent by many friends for the occasion. A vote of thanks was moved by F. E. Thompson, Esq.

Present, members, 50; school visitors, 43; Common Room and friends,

9. Total, 102.

THURSDAY, MARCH 3RD.

The President in the Chair.

A paper was read by S. B. DIXON, Esq., F.G.S., on

THE ORIGIN OF FLINTS,

which is printed in our Report, page 100. After a vote of thanks had been proposed by W. E. Mullins, Esq., an interesting discussion followed between the Rev. T. A. Preston and the lecturer.

Present, members, 30; school visitors, 27; Common Room and friends,
8. Total, 65.

THURSDAY, MARCH 17TH.

The President in the Chair.

G. F. RODWELL, Esq., read a paper on

A VISIT TO THE LIPARI ISLANDS AND AGRAM,

profusely illustrated by some beautiful geological and other maps, and some well executed diagrams.

Present, members, 38; school visitors, 20; Common Room and friends,
10. Total, 68.

THURSDAY, MARCH 31ST.

The President in the Chair.

The Rev. T. A. PRESTON gave a lecture on

BAROMETERS,

illustrated by some ingenious instruments lent by Mr. Rodwell and Messrs. Negretti and Zambra.

Present, members, 14; school visitors, 17; Common Room and friends,
4. Total, 35.

SUMMER TERM.

THURSDAY, MAY 5TH. PRELIMINARY.

The President in the Chair.

A new edition of the existing rules as revised by the Committee last term was submitted to the Society, and opinions invited before the next meeting. The Botanical and entomological sections were renewed, and an ornithological one was started to be under the guidance of the Rev. J. P. Way and Cardew.

THURSDAY, MAY 19TH.

The President in the Chair.

As no suggestion or objections had been made in the matter of the New Rules, they were formally passed: and are now printed in their corrected form at the beginning of this Report.

G. F. RODWELL, Esq., gave a lecture on
ALGIERES,
 which he had visited at Christmas to attend the scientific conference.
 Present, members, 52; school visitors, 47; visitors, 6. Total, 105.

SATURDAY, JUNE 4TH.

The course of ordinary fortnightly lectures was this term varied by an open evening in the Bradleian to hear the Rev. J. G. WOOD give one of his famous sketch lectures on

AN INSECT.

A full account of a singularly successful attempt to interest a very large and varied audience may be found in the Marlburian of June 16th.

THURSDAY, JUNE 16TH.

The President in the Chair.

W. E. MULLINS, Esq., read a paper on

THE OYSTER,

which will be found on page 35, with two double pages of illustrations most happily executed by the President of the Art Society. The audience was deservedly the largest we have yet had, and cordially welcomed a vote of thanks proposed by F. Storr, Esq.

Present, members, 57; school visitors, 31; Common Room and friends, 22. Total, 110.

THURSDAY, JUNE 30TH.

The President in the Chair.

E. N. GARDINER read a paper on

"OUR COLLECTION OF ENGLISH COINS,"

and L. E. Upcott, Esq., in moving a vote of thanks, brought forward some interesting facts in connection with the subject.

Present, members, 24; school visitors, 17; Common Room and friends, 7. Total, 48.

THURSDAY, JULY 14TH.

Rev. J. P. Way in the Chair.

H. L. CALLENDAR read a paper on

COLOUR,

which is to be found on page 25, and after L. E. Upcott, Esq., had expressed the thanks of the meeting, the Rev. T. A. Preston stated a few of the facts which he had discovered, from his recent testing of the eye-sight of the School.

WINTER TERM.

THURSDAY, SEPTEMBER 2ND. PRELIMINARY.

The President in the Chair.

It was stated that the Botanical Section would be discontinued this term, but that the Entomological and Ornithological would go on as before, and that an Astronomical one would be formed under G. F. Rodwell, Esq., L. E. Upcott, Esq., and H. L. Callendar. A very large and handsome collection of curiosities from Ceylon, presented to the Society by H. C. Berwick, was then exhibited.

THURSDAY, OCTOBER 6TH.

The President in the Chair.

F. E. HULME, Esq., read a paper on

UNNATURAL HISTORY,

for which see page 54, and illustrated it by many sketches in chalk on the black board, several of which are fortunately preserved to us in the full-page illustration which accompanies the lecture. The Rev. A. G. Bleek, in proposing the thanks of those present, reminded them that certain very unscientific ideas were still prevalent in the immediate neighbourhood of Marlborough.

Present: members, 83; school visitors, 20; Common Room and friends,
7. Total, 60.

SATURDAY, OCTOBER 22ND.

At an open meeting in the Bradleian the Rev. J. G. WOOD gave his second sketch lecture, this time on

THE SPIDER

to an audience limited only by the capacity of the building. An account of the lecture will be found in the *Marlburian* of Oct. 26th.

THURSDAY, NOVEMBER 3RD.

The President in the Chair.

For the first time during recent years the meeting was held in the Bradleian to accommodate the number of the audience, which has been gradually increasing,

G. H. DAWSON, Esq., O.M., read a paper on

INSTINCT IN BIRDS,

for which the Master offered the thanks of a very large meeting.

Present, members, 50; school visitors, 41; Common Room and friends,
9. Total, 100.

FRIDAY, NOVEMBER 18TH.

The President in the Chair.

In the presence of an unprecedentedly large audience Dr. Fergus read
a paper, see page 68, on

"FIRST AID IN ACCIDENTS,"

and illustrated it by a complete skeleton, and two large diagrams displaying
the arteries, veins, and muscles. At the close of the lecture W. E. Mullins,
Esq., expressed the thanks of all present for the paper itself, and also for the
Doctor's offer to form a class for instruction in Ambulance Work.

Present, members, 64; school visitors, 90; Common Room and friends,
20. Total, 174.

THURSDAY, DECEMBER 1ST.

The President in the Chair.

A paper, see page 81, was read by R. W. MERRIMAN, Esq., on

CASUAL GLANCES AT THE MOON,

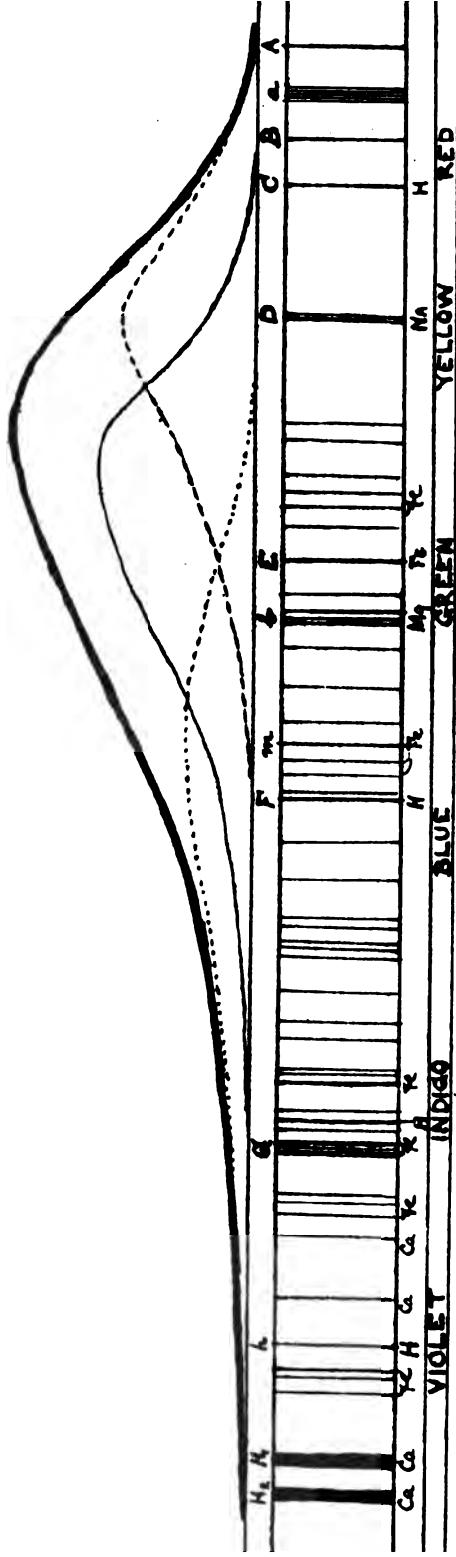
and most happily illustrated by two cleverly executed diagrams, showing
the curvilinear path of the moon, and the formation of a lunar volcano, and
the enormous dimensions of its crater. A vote of thanks was proposed by
W. E. Mullins, Esq.

Present, members, 26; school visitors, 23; Common Room and friends,
13. Total 62.



SOLAR SPECTRUM

COLOUR AND PRIMARY SENSATIONS.



Shewing the principal FRAUNHOFER lines, with their letters, & the chemical symbols of the metals to which they are due.

The dark curve above shows the intensity of the light in various parts of spectrum. The other curves the relative degrees in which the three primary sensations are excited. Red sensation -----; Green -----; Violet

COLOUR,

READ BY H. L. CALLENDAR, JULY 14TH.

THE subject of Colour may appear to some more suited to the sister society of Literature and Art than to this; I must hasten to correct this erroneous impression; it is to be hoped that no members of that society have ventured here in the hope of hearing something quite consummately too-too, for it is my intention to treat the subject rather from a physiological than from an artistic point of view, to endeavour to destroy some of your fondest illusions, not to supplant them by others yet more fallacious.

Before it will be possible to explain to you anything about the sensation of colour, I must give you as clear a notion as possible of the physical interpretation of the phenomenon we call light, or heat. Physically light or heat is a mode of motion, and can be transformed into any other manifestation of force: it is propagated or radiated by a wave-motion in straight lines, except in so far as it is obstructed, reflected, refracted, absorbed and so on, by material bodies. It may seem odd to you that radiant light as we perceive it with our eyes should be a wave-motion, but nothing is more certain; and the waves of light offer considerable analogy to those of water, with which we are most familiar.

If you drop a stone into a still pond, waves spread out in circles from the point of disturbance: the water composing each wave is not transferred bodily, the wave being merely the propagation of a form; the particles of water oscillating backwards and forwards across the line of propagation; thus suppose this stretched cord to represent a line of particles, the motion is transferred from one particle to the next in the same way as this wave travels along the cord. Similarly when the particles of a body are in a violent state of agitation it emits waves of light and heat in all directions, so that each wave-front forms a spherical surface.

Just as on the sea the waves vary in length, so do the waves of light; but all are propagated in space at the same rate and in the same way, by a medium called ether of practically infinite tenuity and elasticity, with the inconceivable velocity of 186,000 miles per second; considerable as this speed is, it was found possible to measure it in a room, the object being to discover whether light travelled faster or slower in a denser medium; and it was found that it travels in water about three-quarters as fast as it does in air, in glass about two-thirds, and in diamond about one-third.* Here we

* More exactly the velocity of light in any homogenous substance is inversely as its index of refraction.

have a simple explanation of the refraction or bending of a ray of light, when it passes from air into glass at an angle with the surface. One end of the wave-front reaches the glass sooner than the other, and is sooner retarded; the effect must obviously be to cause the wave to swing round and change its front, and propagate itself in a different direction.

An incandescent body, like the sun, sets up undulations in the ether of different lengths varying between wide limits, some being about seven or eight times as long as others: all move with the same velocity in a vacuum and practically so in air, but in denser media the shorter waves are much more retarded than the longer, and therefore more refracted. Hence by means of a prism we can decompose sunlight into its component wavelengths. This is best done by an instrument called a spectroscope, which shews a coloured strip of light; if these colours are reblended we have white light as before. Obviously then white light is a combination of all these colours; white light is the sensation excited by a combination of waves of all lengths; the waves which are most bent aside give a violet colour, and those least crimson; and waves of intermediate length which are retarded and refracted intermediately, produce colours of yellow, green, and blue, and various hues of these. Lamp light gives what is called a continuous spectrum, that is, all the colours shade off gradually into each other without any break; waves of all lengths are present in its light: when, however, sunlight is examined in this way, light of certain wavelengths is found to be deficient, and the spectrum is seen to be crossed by a multitude of fine dark lines, called the Fraunhofer lines; their position as regards colour or wavelength is perfectly constant, hence they are the most perfect reference marks imaginable, and are constantly referred to by their alphabetical names. Here is a diagram with their positions and letters marked, A, a, B, C, D, E, b, m, F, G, H 1, and H 2. To each of these lines corresponds a fixed and determinate wavelength, which it is possible to measure by their relative positions: this has been done with exceeding accuracy for all the principal lines of the Solar Spectrum: thus the wavelength of A in the extreme crimson is $760\frac{4}{10}$ tenth-metres, and a tenth-metre is $1\text{-}10,000,000,000$ th of a metre, or $1\text{-}250,000,000$ th of an inch. Hence the length of a wave of this light is nearly $1\text{-}83,000$ th part of an inch, and therefore quite a microscopical quantity: there are waves of light three or four times as long as this but they excite no sensation of vision: the wavelength of the extreme visible violet is about $1\text{-}64,000$ th of an inch, there are 64860 inches a mile, and light travels 186,000 miles per second: hence the impression of this deep violet light is caused by about 760 millions of millions of ether vibrations in a single second; beyond the visible spectrum there are other shorter waves which

cannot be seen but can be photographed, so that the vibration frequency of the shortest ether waves, amounts to about 1000 billions per second.

Differences of colour are thus physically explained by the difference of vibration frequency, or the difference of wavelength of the light; colour is not an inherent property of matter but depends entirely on the kind of illumination. For instance, if the illumination consists of light of a single pure colour, a narrow strip of the spectrum, everything must appear of this one colour, and the only variations possible are those of brightness. The vapour of the volatile metal sodium gives out a perfectly pure yellow light, being one of the colours of the spectrum isolated; the wavelength of this light is about 5890 tenth-metres, and every object whatever its colour in daylight can with this illumination reflect *only* light of this wavelength, and must appear yellow, or black if it reflects no yellow.

If we adopt the common mode of expression we may say that light is characterized by three qualities,

- (1) "*hue*," or colour par excellence.
- (2) "*Saturation*," called depth, fullness or purity.
- (3) "*Brightness*," or quantity of luminous emission.

(1). The differences of the colours of the purest spectrum are solely differences of "*hue*," or rather all differences of hue form a series, which returns on itself, and which is that of the colours of the solar spectrum arranged round a disc with the crimson and violet joined by shades of purple; for all natural colours except purple are exactly similar to some colour of the spectrum as regards hue.

(2). All the colours of a pure spectrum are perfectly "*saturated*," they are physically simple wavelengths, and cannot be resolved into others colours: or we may express it thus, they contain no proportion of white. Ordinary colours of paints, wools, dyes, etc., are never quite saturated, even the deepest colours always containing some white in their composition.

(3). The third difference that of brightness may be considered either as due to deficient illumination, or to dilution with black; thus grey, which is white diluted with black, may appear exactly the same as a white less brilliantly illuminated; and maroon, brown, and olive may be produced by diluting the red, yellow, and green of the spectrum respectively with black, or by diminishing the illumination.

All these differences may be represented on what is called the cone or pyramid of colour. The vertex represents absolute blackness, and any line through the vertex runs through the same colour as regards hue and saturation, but increasing in brightness from the vertex downwards. Every plane section of the cone perpendicular to its axis, shews all distinctions of colour except as far as concerns brightness. Round the edge of such a section are

arranged the saturated colours of the spectrum ; in the centre is white, lines running from the edge to the centre contain the same hue less saturated as we approach the centre ; on opposite sides of the centre are complementary colours, *i.e.*, colours which when added together produce white.

The arrangement of such a disc may appear rather arbitrary : but if we take by reference to the Fraunhofer lines any three definite colours or wavelengths, and agree to place their combination colour at the centre of gravity of the three, all the other colours may be definitely arranged, by finding in what proportions they must be mixed to produce white ; but an adequate method of mixing the colours must be used or the result may be beautifully erroneous.

Your first notion would be to get paints and mix them with a brush and water. This would be useless for several reasons. No paints are pure saturated colours ; none transmit less than a quarter of the spectrum, and all reflect a certain amount of white from their surface. Next a mixture of paints with brush and water is far from being a mixture of their colours, it is duller than either of its components ; whereas the sum of two colours should be brighter than either. The colour of a mixture of paints is that which is absorbed by none, just as when you look through two differently coloured glasses superposed, the landscape is far darker than it is as seen through either separately. In fact in ordinary mixture of paints you add their absorptions, not their emissions.

It is possible to add the colours of paints by arranging them in sectors on a disc, and rotating the disc so rapidly that a continuous and uniform impression is produced. Thus if you mix vermilion and ultramarine with water, the result is a dirty grey, because each is a fairly pure colour, and is almost entirely opaque to the wavelengths transmitted by the other. Whereas if combined on the rotating disc the effect is quite different ; the true combination colour, a glorious purple, is obtained, which shews a wonderful contrast to the water mixture.

The best way, however, is to combine the saturated colours of the spectrum ; for the solar spectrum is the most perfect photoscope imaginable, as it contains in the Fraunhofer lines cognisable marks whose wavelength or colour is exactly the same in any spectroscope, without the possibility of errors of individual sensation creeping in. Colours corresponding to any particular parts of the spectrum, chosen by reference to the Fraunhofer lines, may be combined with beautiful simplicity in any proportions by an instrument called Maxwell's colour box. In a box painted black within are contained a lens and a prism ; an adjustable slit admits sunlight, and an image of the solar spectrum is formed by the lens and the prism on the other side of the box, where are placed three moveable and

adjustable slits, which may be fixed by reference to the Fraunhofer lines. If then the three slits are turned towards the light, and the observer looks through the single slit, he will see the lens filled with the sum of the three colours at which the slits were fixed. The position of the colours of the spectrum round the colour disc may be thus determined. It is found that the colours will not arrange themselves round a circle, but round a triangle with the corners rounded off; the colours at the corners are crimson, green, and violet, and by the law of the formation of the disc, it is evident that all the colours it contains can approximately be imitated by mixtures of these three in various proportions. Red, yellow, and blue are not the primary colours; for the sum of blue and yellow is not green but *white*, and violet cannot be exactly imitated by any mixture of red and blue. A blue and a yellow paint will make green, because they both transmit only the green part of the spectrum: a blue paint extinguishing as a rule the red and yellow, while a yellow extinguishes the blue and violet, but both freely transmit green.

But if we experiment on the summation of pure colours we find that crimson and green in varying proportions will reproduce every shade of scarlet, orange, yellow, and yellowish green, according as the crimson or green predominate; green, however, is a primary colour, and cannot be imitated by mixture of blue, yellow, and red; bright blue again may be exactly imitated by a mixture of green and violet. As a matter of fact colours so made are slightly less saturated than the pure wavelengths of the spectrum, and their only similarity is that they appear the same to the unaided eye.

With these preliminary facts about colour, we may proceed to the explanation of colour sensation.

You all know that the eye is in structure a *camera-obscura*. Here is a model of an eye, which will explain it better than words alone. A picture of the external world is formed by the crystalline lens and cornea on the back of the eye, and falls there on a sensitive nervous structure called the retina. Ancient physiologists imagined it was directly felt there as light; but it is not so.

According to the theory of the specific action of the senses, our apprehension of the external world depends on peculiarities of the central connections of the nerves which are excited; thus certain changes are produced by external impressions in our organs of sense, and these are transmitted to certain parts of the brain by nerve fibres. If the fibres which convey the impression are cut through, the organ may continue to be excited, and its state may be just as perfect, but the sensation or perception no longer exists. If the optic nerve connecting the retina with the brain were severed we should not see; light is not therefore felt directly in the retina: another

proof of this lies in the fact that the visual impression of a solid object of three dimensions is only produced by the combination in the brain of sensations derived from both eyes. With one eye everything looks as flat as a picture, and the attempt to snuff a candle with one eye will result in dismal failure. What the brain directly apprehends is not the physical exciting cause, but the excitement of the nerve fibres. Now all nerve fibres, those of sight, hearing, taste, smell, touch, motion, etc., have exactly the same structure; all are alike clear cylindrical threads of the same microscopic minuteness, of the same material, the same electromotor actions; all can be excited by the same mechanical, electrical, chemical, or thermometric changes; in all sensation is propagated at the same speed of about 100 feet per sec.: and all die when subjected to like conditions. The sensations which their excitation causes depend entirely on their central connections. Thus the same radiation which the eye perceives as light, excite the nerves of the skin with a sensation of heat; and again, *however* the optic nerve is excited, it produces in the brain a sensation of light; a weak electric current, a blow, or slight pressure, produces the sensation of a flash of light in a dark room; and it is instructive to notice that of old it was assumed that actual *objective light* was produced, and so seen; whereas in reality not the smallest spark of light is produced, only the irritation of the optic nerve must always produce light sensations. Similarly the nerve may be excited by pressure of the blood in fevers, or by some narcotic drugs; or the stump of the optic nerve in cases where the eye has been lost may be irritated with the same result; and it is noticeable that in all these cases the sufferer feels certain that there must be some luminous body present. Physical light only differs from other methods of exciting the optic nerve in this respect; that since the eye is so well protected in its bony orbit from external influences, it can only be exceptionally influenced by them, whereas it is continually exposed to the influence of the ether undulations, for the perception of which it is specially adapted, and incomparably more sensitive than any other organ of the body; but we must not forget that the sensation of light, and the wave-motion of the ether are really quite distinct; that light and colour are not inherent properties of objects, but only *qualities* of them in relation to the eye: just as *weight* is a quality of matter with respect to the earth, or *solubility* expresses the behaviour of a substance with respect to water.

All ether waves have one effect in common, they raise the temperature of bodies on which they impinge, and are accordingly felt by the touch as heat. This heating power is directly proportional to the energy or amplitude of their vibration. The eye, however, is only sensitive to a small part of the undulatory emission; the waves longer than a certain limit are quite invisible, though their intensity in the spectrum is 10 to 20 times as great as

that of the intolerably brilliant yellow; the total heating effect of these longer waves is about eight times that of the visible waves; but though the light of a candle may be seen a mile off on a clear night, these rays are quite invisible even if so concentrated as to be twenty million times as powerful. They can be rendered visible by focussing on a thin sheet of platinum, which becomes white hot in the focus.

Again beyond the extreme violet there are other shorter waves, which cannot directly excite any sensation of sight, but whose vibration frequency is so lowered by certain *fluorescent* substances that they are brought within the range of visibility. These rays have considerable effect in decomposing salts of silver, and their extent and existence can therefore be proved by photography.

The difference between our sensations of heat and light produced by this same vibration of the ether is so utter, that till about forty years ago philosophers refused to believe, that they were merely different manifestations of the same power. Heat was a "kind of peppery substance which used to ooze out of matter under certain conditions." Now it has been abundantly proved that heat is the same mode of motion as light, and is subject to the same effects of polarization, reflection, refraction, magnetization, etc. The mistake of separating heat and light merely arose from confounding differences of sensation with objective differences. Similarly Goethe was led to contradict Newton's discovery of the composition of white light, because having been accustomed to mixtures of paints making a darker colour he could not persuade himself that what appeared to the eye as the purest manifestation of the brightest light was itself made up of darker colours.

We see then that our sensation of light is merely a sign and an imperfect and variable one, of the wave motion of the ether. The law of the correspondence of the subjective and objective in vision is as follows.

"Similar light produces under like conditions a like sensation of colour; lights which under like conditions produce unlike sensations of colour are dissimilar."

I will proceed to develop this law and show how necessary every word of it is though it may sound tautological. To begin with, the sensation of sight is an imperfect sign, for it may be excited otherwise than by ethereal undulations. Next we cannot say "lights which produce a similar sensation of colour are similar," for we saw above that white for instance might be made in an infinite number of ways; scarlet and bluish green, or yellowish green and violet make perfect whites, indistinguishable to the eye, but otherwise utterly different, e.g., the first would come out black in a photograph and the second white; and seen through any coloured glass, or better through a spectroscope their difference would be at once

apparent: their only similarity is that they appear the same to the unaided eye. In this respect the eye is inferior to the ear, for the red near O combined in proper proportions with the green near E would give a yellow indistinguishable from D, but to the ear the note D could not possibly be substituted for O and E.

Again it is only under like conditions that the same light produces a like sensation of colour. If the eye happens to have been fatigued for scarlet white would appear bright blue; so similarity of colour must be judged by the same eye at the same time; and moreover by the same part of the eye; for since the fovea centralis is coloured yellow, blue will be weakened there more than elsewhere on the retina.

There is a beautifully simple theory first propounded by the great Dr. Thomas Young, which explains and reduces to law all these curious facts about colour sensation. It may be stated as follows. The eye contains three differently connected nerves; one kind is most excited by the longer visible waves, and hardly at all by the shorter; its excitation causes a sensation of crimson light; other nerves are most strongly excited by waves of middle length and give the sensation of green; and others by the shorter waves and give the sensation of violet. The excitation of all three as by sunlight produces the impression of white light. Thus starting from the red end of the spectrum, we first have the crimson excited in its greatest purity, further on this becomes mixed with green, and passes into scarlet and orange till when the crimson and green sensations are equally excited (and the violet as yet hardly at all) a sensation of yellow results; this gradually passes off into green, as that sensation predominates, and this again into blue fading off gradually into pure violet.

Thus theoretically the colour disc should be a perfect triangle with the colours corresponding to the three elementary sensations at its corners; as a matter of fact no wave-length excites the green sensation without exciting the crimson and violet also, though it is possible by fatiguing the eye with purple to see a far more saturated green than is objectively possible; consequently no colour of the spectrum reaches quite into that corner of the theoretical disc, however we can none the less express every colour in existence in terms of these three elementary and theoretical ones, by first determining its position on the disc, and then the proportions of the three colours in its composition.

The normal eye then has three colour sensations and may be called the trichroic eye; in some few cases however (and this is one of the strongest confirmations of the theory), the system of colours is still further reduced to two elementary colour sensations; such persons are commonly called colour

blind, because they confound colours which to the trichroic eye appear utterly distinct.

The usual method to test for colour blindness is with various craftily arranged coloured-wools; this is a very useful method for detecting the existence of colour blindness provided the individual is fairly acquainted with names for colours; but it is very misleading as to the real quality of the deficiency. The best method is to examine such with the perfect photoscope, the solar spectrum; for very few are acquainted with its mysteries, and will consequently tell you their real experiences, rather than they would with coloured wools, where they have been accustomed to endeavour to deceive themselves into imagining differences all their lives. I have examined several with the solar spectrum, and all agree in saying that they see two colours, which they call blue and golden yellow, with a kind of dull white at their point of junction, which is midway between B and F, where blue and green join to the normal eye; from b the same tint prevails as far as B where the spectrum seems to die out, *and the sensation of red is quite absent*. Bluish green, grey and crimson lake will all appear similar to them. All colour blindness that has been *accurately* investigated appears to consist in this deficiency of the crimson sensation. It appears to be a mistake to talk about red-green blindness or blue-yellow blindness; for coloured wools, though admirable for the detection of colour blindness are delusive with regard to its nature.

As an illustration of this I may take the case of a boy whom the test sheet of wools convicted of "that kind of red-green blindness which is called green-blindness." If that phrase means anything it means that the green sensation was absent. The Spectroscope, however, shewed that his sensations were exactly the same as those of all other colour-blind people I had examined, and proved unmistakeably that the red sensation only was absent. I then examined the wool test to see how it could indicate the absence of the green sensation: the test was to distinguish between a light crimson purple and a darkish blue-green. Examined with the Spectroscope the purple gave an absorption band stretching from just before D to somewhat beyond F: that is the wool reflected all the scarlet and blue. The scarlet band excited the green sensation considerably, so that a colour blind person called it a *bright yellow*, (*i.e.* green) band; this when combined with the blue seemed to him to give a greyish white, and to appear exactly similar to the blue green, though slightly brighter. The confusion is easily explained, given the red sensation absent; but on the supposition of green blindness it is inexplicable. For then the blue-green would have appeared a *very deep violet*, and the purple a *very full and brilliant crimson lake*; whereas since the purple was dulled to the level of the dark blue-green, the deficiency of sensa-

tion was obviously red. "Blue-yellow blindness" seems to me a yet greater infelicity, and can only mean that a person confounds certain blues and yellows, neither of them being primary sensations; probably this case would be just as reducible to red blindness as the other.

I regret to say that owing to the enormous size of my subject I have had to omit many tough points of the greatest interest, such as the production of colours in the iridescence of the soap-bubble, mother of pearl, and in the rainbow and diffraction fringes and other phenomena depending on the character of the wave-motion of light. I have also entirely avoided the subject from the artist's point of view; but I hope I have succeeded in impressing you seriously with the fact that "things are not always what they seem."

THE OYSTER,

READ BY W. E. MULLINS, ESQ., JUNE 16TH, 1881.

THE position of the oyster in the animal kingdom being thus determined,* the first question that will next occur to those who approach the subject as, from our traditions, we are pretty sure to do, from its historical or literary side, is why it was called the oyster. Does the name give us any information as to the nature or habits of the animal? Directly, I am bound to say, none. The meaning of the word is too uncertain for it to be worth our while even to consider the various guesses that have been hazarded about it. Indirectly, however, the name does teach us something. For when we find that through all Europe the same word or the same with slight, and unimportant modifications is in use:—in Greek *ostreon*, in Latin *ostrea*, in Scandinavian *østra*, in German *auster*, in French *huitre*, in English *oyster*,—we may be quite sure that familiarity with the oyster, and that implies familiarity with it as an article of food, must date back to the very earliest times. It would be incredible that the Romans should have borrowed the name from the Scandinavians, and then passed it back to the Greeks, and perhaps even more incredible that the Scandinavians should have learnt the name from the Romans. We know besides that the oyster was cultivated by the Romans nearly two thousand years ago, and we know too that long before the historic period it was a favourite food of the tribes living on the shores of the Baltic; for “along the shores of nearly all the Danish islands, says Lyell, mounds (kitchen refuse heaps is the literal translation of the Danish name) may be seen, consisting chiefly of thousands of castaway shells of the oyster, cockle, and other molluscs of the same species which are still eaten by men. These shells are plentifully mixed up with the bones of various quadrupeds, birds, and fish, which served as the food of the rude hunters and fishermen by whom the mounds were accumulated.” “Similar large heaps of oyster-shells with interspersed stone implements near the sea-shore can be seen too both in Massachusetts and Georgia, which were left by the North American Indians at points near which they were in the habit of pitching their wigwams, for centuries before the white man arrived.” We may therefore fairly conclude that before our Aryan forefathers dispersed on their wanderings throughout Europe they were well acquainted with the savoury bivalve. Without pledging myself to any theory about the origin of man, it is not

* The introductory matter is omitted.

uninteresting to note in connection with this question of the antiquity of the oyster as an article of food, that monkeys also are very partial to it, and that they contrive, at least so I have read, to open the shell and extract the animal with no mean skill. I am not clear how they manage it, and have indeed my own private opinion that like King George I. they perhaps prefer the oyster with a somewhat stronger taste than does the ordinary Englishman, not quite fresh in fact, in which case they would only have to wait, as we shall afterwards see, until the shells opened of their own accord.

Turning from these side questions to the oyster itself, the first thing that naturally attracts our attention, as it did poor David Copperfield in the case of Dora's never-to-be-forgotten barrel of unopened oysters, is the shell, the house of the animal.

This shell consists of two valves, both irregular, and both covered with furrows. One, the upper and smaller valve, covers the right side and is nearly flat. The other, the lower valve, covers the left side and is very concave. The oyster is therefore unequivocal and irregular. It will help you to distinguish between the two sides, if you remember that like a well-directed, well-handled hamper, the oyster always keeps his right side uppermost.

Each valve when carefully examined is found to consist of two distinct parts:—an outer and an inner, made up of different kinds of plates or laminæ—both formed, built up or secreted, from the inside by the mantle or beard, of which I shall have to say something presently; but the outer by the lower edge of the mantle, or that remote from the hinge, the other by the central and back parts of the mantle. The outer laminæ of the shell consist of portions of a cone, are thin near the hinge, but get thicker and thicker towards the outer edge. This is what we should naturally expect, all the part near the hinge having been formed in the oyster's extreme youth, while the outer surface is increased only by the forward edge of the mantle, and thus the hinge gets further and further removed, as the oyster grows, from that part of the mantle which could alone increase it. It is accordingly only the newest part, the part furthest removed from the hinge, which marks by its growth the increasing power of secretion of the oyster's mantle. The inner shell on the other hand, secreted as it is by all that part of the mantle which lies between the forward edge and the hinge, consists of a series of parallel layers which unlike those forming the outer surface, are necessarily more numerous in the oldest, or hinge part of the shell, fewest on the side remote from the hinge. The outer surface it will be observed projects a little beyond the inner, and it is said that an experienced fisherman or oystermonger can tell the age of an oyster by the number of furrows,—of that however I am a little sceptical. Some of the oysters on the table have distinctly added a line

of furrow to the outer surface of each valve during the five or six weeks they have been my guests. It would only be with great patience, a powerful glass and under favourable circumstances, I imagine, that anyone could observe the growth of the inner surface. It has however been very interesting to watch the growth of the shell at all.

These two valves are joined together by a hinge, which consists of a number of very elastic fibres, parallel to one another, and at right angles to the surfaces of the valves they connect.

These fibres are secreted by the part of the mouth adjacent to the hinge, and as they are secreted only when the shell is slightly open, they are too long to allow the valves to shut of themselves, by the mere force of gravity. To keep his house therefore free from unwelcome intruders, whether animate or inanimate, the oyster is provided with a powerful muscle which connects the two shells, and by it the oyster can overcome the elasticity of the hinge ligament. The oysterman opens the oyster by severing this muscle. Of course when an oyster dies the muscle relaxes, and the valves gape, so that whenever the shells are closed you may always be quite certain not only that the oyster is alive, but also that he is exercising no slight amount of muscular power in overcoming the elasticity of the hinge. Further, I may note, that if, when the open oyster is handed you, the muscle appears sunk, it is a proof that the animal was alive when opened, if it appears higher, if it stands out above the oyster, it was dead before it was opened and the animal is unfit for food. In many of the conchiferae and in some oysters the shell on each side of the hinge is slightly indented, so that one shell fits into the other. This of course increases the security and prevents anything like a twisting wear in the valves or hinge.

The inner surface of the shell is smooth and more or less nacreous, that is, mother of pearl like. This lustre is due I believe to the decomposition of the rays of light by the infinitely small and semi-transparent projections, roughnesses or corrugations which cover the surface, and this peculiarity of structure is itself said to be due to the proportions, in which calcareous and animal matter are combined to form the surface.

Pearls are really part of the same material, secreted by the mantle in an abnormal or irregular way. Sometimes, but not often, to cover an intrusive grain of sand, sometimes to fill up a hole in the shell, made by the boring tongue of one of its enemies, and most frequently to cover some organic substance, which has found its way inside,—the bodies or eggs of very minute internal parasites,—in every case they are due to unnatural irritation of the secreting parts of the mantle. “* The ingenious Chinese obtain pearls

* Woodward.

artificially by introducing into the living mussel shot and pieces of mother of pearl fixed on wires, which then become coated with a more brilliant material." In the British Museum there are a number of little josses made of bell-metal completely coated with pearl on the inside, and the famous Linnaeus was knighted by his sovereign for showing how by artificially boring the shells the animal could so to speak be compelled to produce pearls almost at will.

As an example of the amount of irregularity that there is in the shape of the oyster shell it is worthy of mention that there is one particular kind which has a shell as large as a plate, and so flat and transparent that in China and Japan it is used for windows and for other purposes where we use glass.

We will now consider the animal itself. It must not however be forgotten that though I called the shell the oyster's house, the metaphor is somewhat misleading. It is obvious from the way the shell is formed that it is nearly as much part of the animal as our bones are of us, and it has been called a pneumo-skeleton, being really a calcified portion of the mantle of which the breathing organ is a particular part, and in fact the muscle of the oyster is fastened to the shell as our muscles are fastened to our bones.

When the shell is opened the oyster, simple as its organization seems, is found to be provided with organs of digestion, circulation, and respiration. I have here two figures,—taken from a pamphlet by Karl Möbius, Professor of Zoology, at Kiel—one of a Schleswig Holstein oyster, (fig. 1) taken after he was twelve years old, the flat upper valve of the shell has been removed, the figure therefore shows the right side of the animal." *

The other (fig. 2) is a section made through the hinge of an oyster between seven and eight years old.

As far as oyster anatomy is concerned, you will probably be quite satisfied, if I limit myself to a description of these two figures, and that in no great detail.

Fig. 1. The right valve is taken off. The Mollusk is lying in its natural position in the hollow left valve. At the hinge end you see the thickening layers of the inner surface of the lower valve. Several such laminae are formed every year. This inner surface is white, more or less mother-of-pearl-like up to the edge, the most recent addition to the outer surface, and this is of a brownish tint. A little below the middle is the section of the

*I cannot make this first reference to the figures without expressing my very warm thanks to Mr. Baker for having copied them. I do not of course yet know how the printer will succeed in reproducing Mr. Baker's drawings, but I am afraid it is inevitable that something at least of the delicacy of touch as well perhaps as of the wonderful clearness of the details must be lost in the mechanical process.

muscle. When the upper valve was taken off this had to be cut through. Part of the mantle on the right is folded and turned back to shew the branchiæ or gills underneath. The left flap of the mantle lies on the left valve and extends farther than the right. Under the fold of the upper part of the mantle can be seen the gills or branchiæ. There are four of them. Of these four only one however is much exposed; of two, a rim is visible, one is wholly concealed. All four have grooves running from within outwards. These grooves or channels are covered with cilia, very fine hairs capable of independent motion, which move backwards and forwards and thus drive the water over the gills or branchiæ through which the animal breathes.* On the upper side of these gills there are two pairs of striped laminae, you can only see one, these you may call the lips, between them is the entrance to the mouth. The part of the body between the hinge and the muscle contains the liver, the stomach, the intestines, and the heart. The muscle itself consists of two parts, the upper being gray and fine, the lower white and coarse. It is popularly called the heart, from a mistaken notion that because, when it is cut, the valves open, therefore it is the centre of vitality.

(Fig. 2). The vaulted left valve (*le*) is as usual somewhat thicker than the flatter right (*re*), and both are thickest over the muscle.

(*a*) is the hinge which by its elastic power keeps the valves apart, as long as the muscle does not pull them together.

Above the muscle is the heart (*h*), the stomach (*s*), and liver (*l*), which when the animal is alive is of a brownish colour. Round the stomach and liver is the ovary (*c*) of a yellowish tint during life. Above the liver are the four lips (*b*) of the mouth. Below the muscle are the mantle flaps. They get slightly thicker towards the edges, when alive they are trimmed with a delicate fringe of cilia, and can be pushed forward a little beyond the edge of the shell. Between the flaps of the mantle are the four gills or branchiæ (*br*). The mantle and gills together form what is called the beard.

Such then is the anatomy of the oyster, such are the organs by which this molluscous invertebrate creature fulfils its modest part in life of scavenging the sea and providing food for men and monkeys. It uses them not perhaps in quite the same way as we use our corresponding organs, but at all events in a similar way for digestion, circulation and respiration.

The mouth, concealed under a kind of cowl formed by part of the mantle is perfectly soft, jawless, and toothless, it cannot therefore seize anything, though it has the power of rejecting food that is not to its taste, the lips

* Casts of oysters were exhibited on the table, which showed some of these details even more clearly than the figures.

or labial fringes acting as sentinels to mark the approach of any unsuitable or dangerous food. This mouth leads at once into the stomach through which the food passes into the intestinal canal which is cylindrical in form, and of uniform size throughout. This canal after various convolutions in the ovary and liver twists round the muscle and leads down to the vent, through which the undigested food is discharged and which like the mouth is concealed between the edges of the mantle. The liver which makes up a great part of the body of the animal surrounds the stomach and part of the intestinal canal. The branchial fringe is covered with countless cilia or minute hair-like filaments which are in constant vibration, and keep up a steady current of water over the gills, thus bringing within reach of the mouth the aquatic plants and animals on which alone the oyster feeds. These cilia move independently of the rest of the body and indeed of any nervous system that there may be, and not only move during life, but, after life itself is extinct, until they themselves decay.

It is by this action of the cilia that the oyster removes the impurities in turbid water, and is so valuable as a scavenger. This can be easily and satisfactorily illustrated by putting an oyster in a tumbler containing a solution of salt-water and indigo—the housemaid's blue-bag. In a short time,—half-an-hour perhaps—the water will be perceptibly clearer, and will be in marked contrast to a similar concoction in another tumbler without an oyster.

The food then, consisting of minute aquatic plants and animals, is brought by the cilia to the mouth, passes through it into the stomach is there acted upon by the bile or secretion of the liver and probably, also by a gastric juice secreted by the membranous lining of the stomach, then passes into the intestinal canal, supplies the veins with the elements necessary to life, and finally after the life-giving elements have been abstracted is expelled through the vent.

The heart, about the size of two peas, consists of an auricle, which receives the blood from the gills, and a muscular ventricle irregular, unsymmetrical, and generally somewhat elongated in shape, which propels it into the arteries of the body. From the capillary extremities of the arteries the blood collects again into the veins, circulates a second time through the breathing organs and returns to the heart as arterial blood. The blood is colourless or of a bluish white. Circulation then is not a complex affair in the oyster.

The oyster has no brain properly so called, and the nervous system altogether is so imperfectly developed that for a long time the most careful investigators supposed there was not any. It seems clear at all events from its extreme simplicity that the sensibility of the oyster to either pleasure or

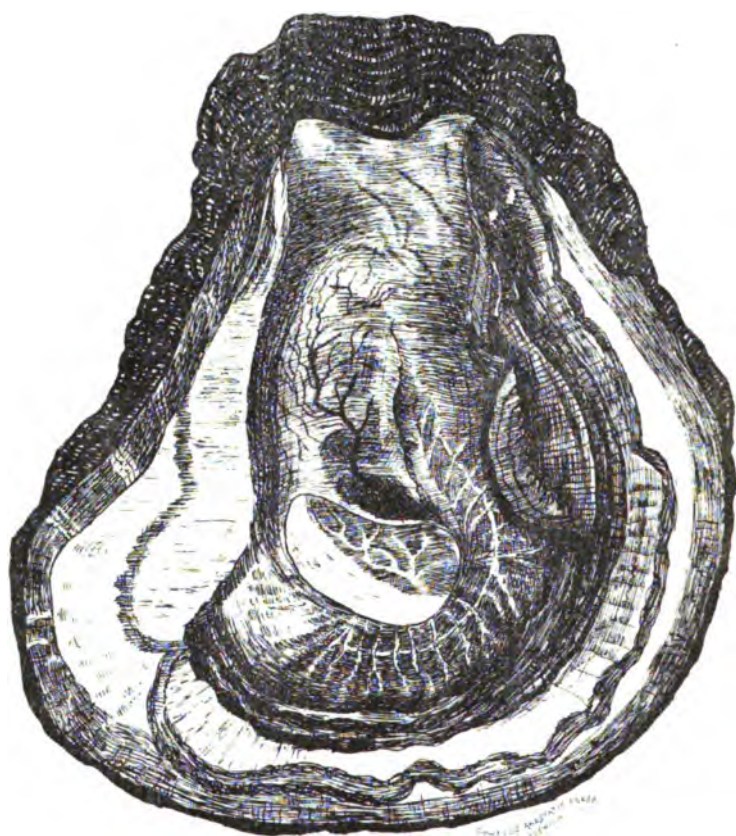


FIG 1.

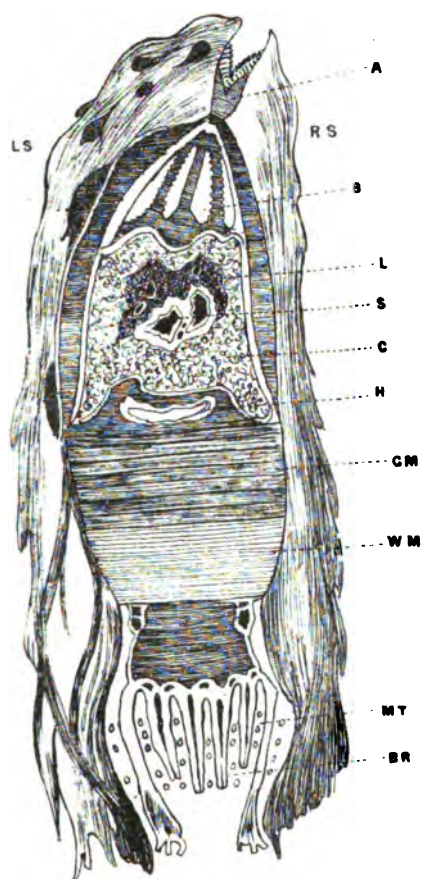


FIG 2.

pain must be extremely limited, a fact which is on the whole satisfactory, as we eat the animal alive. Its instincts too must be very few, and no special organ of sense can be detected, except that of touch which appears to reside in every part of the mantle, and in some way it has a sensitive perception of the change of light, for if the shadow of an approaching boat is thrown forward so as to cover it, it at once closes the valves of its shells long before any undulation of the water can possibly have reached it. And I myself have constantly noticed that if my head overshadowed the oysters in my little aquarium, where there could be no suspicion of a movement of the water, they would at once at all events partially close their shells. There may be also something corresponding to the sense of taste in the lips or labial palps which cover the mouth.

The process of respiration is no less simple than that of circulation and digestion, indeed the acts of breathing and feeding are one and the same; for it breathes by means of the branchiæ, and the air is brought to these branchiæ or membranous leaflets by the same action of the cilia as brings the food. The current of water that brings the food brings also the air.

The object of respiration is to remove the carbonic acid gas from the blood, and to supply it with oxygen instead, and the principle by which it is effected, is, I believe, exactly the same throughout the animal kingdom, that principle being one, many of you must have become familiar with in your chemical lectures, the principle of the diffusion of gases. On one side of the membrane is the blood, on the other is oxygen, either in the air or as in the present case in water. The ciliated fringe keeps a constant current flowing over the membranes of the branchiæ the oxygen is gradually interchanged for the carbonic acid gas in the blood on the other side of the membrane and the blood thus renovated pursues its life-giving course through the animal's body. When the oyster is breathing he moves his mantle just like a lady moves her fingers when playing on the piano. These branchiæ also serve to hold the eggs after they escape from the ovary, and there safe between the membranes of the branchial leaflets they undergo a kind of incubation and even acquire appreciable size before the young oysters are cast forth upon the waters.

But although the oyster spends so much of its time in bed and is so deficient in sensibility, yet—and the fact may not be without its encouragement to some,—it is capable of a limited education. Indeed the Inspector of the Irish fisheries draws a very decided line between the educated and the uneducated oyster, and the gain derived by the educated oyster is no slight one, for it will live at least twice as long as an oyster that has not been educated, an illustration no doubt, if you will, of the survival of the fittest.

The process of education is not a very elaborate one. If the deep sea oyster is sent off as soon as it is caught, it is very probable, indeed it is almost invariably the case, that he has not taken the precaution of keeping enough liquor in his shell for the voyage, accordingly the French adopt the ingenious plan of putting him on the foreshore, which is left dry every ebb-tide. After a few days the oyster finds by experience that he will be for some hours without water and that unless he lays in a sufficient amount for personal use he will be put to no small inconvenience, and in this way after about a fortnight's practice he regularly takes enough water into his shell to serve him until the next tide rises. When he has learnt this lesson, he is found to live nearly twice as long on his travels to the consumer as the uneducated oyster taken fresh from the deep sea.

Nothing certain seems to be known of the way in which the oyster is multiplied. According to the old theory, it sprang from putrid matter, "*Ostreorum ortus causa putredo quædam esse videtur.*" That theory need not detain us long, but it is not easy to substitute another for it, the evidence is so very contradictory. According to some the sexes are distinct, there are male oysters and female oysters; according to others the sexes are not distinct. "In all climates and in all its varied species" says Mr. G. W. Hart in the report of the Irish Commission, "the oyster is hermaphrodite, though the precise manner in which impregnation is effected is still an unsolved enigma, but artificial fecundation such as is practised with the salmonides is impossible from the fact that fecundation takes place before the extrusion of the ova from the ovaries." There are yet others who say that at one period of its life the oyster is of one sex, and at a later of the other.

It would be unprofitable for a mere outsider to occupy your time by minutely discussing a question still in such confusion. I will content myself with giving you, as far as possible in their own words, the actual opinions of the great authorities on this evidently difficult question. Mr. Eytton, after a careful examination of a great number of specimens, arrived at the conclusion that the oyster was ovoviparous, i.e., that the young were hatched from eggs in the interior of the parent, and that it was unisexual. He held that the white sickness and black sickness as the fisherman call it, are not really different, but the same thing in different states, that the spawn is always white until it leaves the ovary, and only becomes black afterwards. The evidence given before the Committee of the House of Commons in 1876, seems to me on the whole in favour of this view. Mr. Austin, it is true maintained, though not I think quite consistently, that the sicknesses were distinct, that the white sickness was from the male oyster, the black sickness from the female. "There is he says "no sign of formation in the white sickness, while the black sickness is the oyster

itself." He was unsupported however either by Professor Buckland or by those actually engaged in breeding oysters. Captain Edward Johnson says very decidedly, and few could speak with more authority, that the white sickness is simply immature spat, that has not come to maturity. "When you see it black it has then arrived at maturity, and is fit to be thrown off."

Professor Karl Möbius after a number of experiments, conducted evidently with the greatest care, maintains the third theory, finally concluding that the eggs and the reproductive elements in the ovary do not exist simultaneously but one after the other, that the reproductive elements (*Befruchtungskörper*) may come into existence very soon after the extrusion of the eggs, and that during the breeding period, very probably one half of the oysters in any tract of ground produce only eggs and the other only spermatozoa.

On the other hand Mr. W. K. Brooks, Associate in Biology at Baltimore, U.S., the latest and perhaps even the most thorough of the inquirers, says in a very interesting pamphlet on the development of the oyster, that although he submitted more than a thousand oysters to microscopical examination, he did not find a single hermaphrodite; a fact sufficient he considers, to establish the distinctness of the sexes at the breeding season. He adds, however, with a caution which is as modest as it is truly scientific that it may be possible that later in the year hermaphrodite individuals may occur, that there is nothing improbable in the statement that oysters change their sex, and that an individual oyster may be a female one year and a male another year, but his observations certainly do not indicate that this is the case with the American species. He further says that after having carefully searched the gills and mantles of more than a thousand oysters he did not find a single fertilized egg or embryo in any part of the mantle-chamber, in or on the gills or anywhere else inside the shell. This negative evidence, together with the fact that the eggs can be hatched after they have been artificially removed from the ovaries, seems sufficient to prove in the absence of all evidence to the contrary, that the eggs of the American oyster undergo development in the open ocean. Mr. Brooks is somewhat puzzled at the consensus of opinion against him from this side of the Atlantic, and after examining the evidence of Messrs. Hart, Eytton, and Möbius—he does not seem to have seen Prof. Buckland's or any of the evidence taken before the Committee of the House of Commons,—he concludes by saying very cautiously that it seems possible that some at least of the eggs of the European oyster may be fertilized outside the shell, as is the case with the American species; but there does not at present seem to be any reason to believe that they ever complete their development elsewhere than inside the shell, and that though it is impossible for an American to decide this point, it certainly is one to

which the renewed attention of European naturalists might well be directed.

Figure 3 is taken from the pamphlet by Karl Möbius: *a. to a.* are magnified 125 times, *f.* and *g.* 150 times. *a.* The egg. *b.* shows the initial development. *c.* The yoke divided into two unequal balls. *d.* A later state of the same. *e.* The egg resolved into a number of cells. The depression is the beginning of the alimentary canal. *f.* The oyster in its swimming stage, with a shell. The shell is transparent and the course of the alimentary canal can be distinctly seen through it. The arrow points to the mouth. Behind the mouth is the stomach, the arrows in it show the course followed by the food. The end of the intestines is just above the mouth. To the left of the first division of the stomach is the muscle, and below, the cilia, the organs of motion, which a muscular contraction can draw into the shell. *g.* An embryo, perhaps six days old;—the valves of the shell, on each side, are held together by the muscle. Below is the swimming pad.

It might I think not unreasonably be supposed that a creature as gentle and inoffensive as the oyster, a creature unaggressive in its daily life, one which satisfies the instinct of hunger with animal and vegetable life too minute to be visible to any but the microscopic eye, it would not I think have been unreasonable to suppose that such a creature would have but few if any enemies, and that if it had any its shell would be sufficient protection against them. This is however by no means the case, it has many. Enemies that appreciate the taste of the animal quite as much as either man or monkey. Enemies too that are very particular about the freshness of their food, and to whom the shell is much less of a difficulty than it is to us.

First of all there is the shrimp which revels in the newly hatched oyster, the spat as it is called, while crabs and lobsters eat them when they are a little older. Captain Edward Johnson, of the Medina oyster beds told a Committee of the House of Commons that he had seen a shrimp lying in wait under the shell of an oyster, and when the oyster spatting darted out and swallow the spat with great delight. The goby and the young mullet he says are also very fond of them. A particular kind of sponge called the Olione gets into the shell of the grown oyster and so riddles it with holes that the shell becomes quite rotten and crumbles away in the fingers. An oyster afflicted with Olionitis, as Prof. Buckland humorously calls it, has to be spread out in the sun, and the sun will kill the sponge.

The Mussel is another enemy. It sends forth shoals of young mussels or mussel spat which fall down upon the oyster beds and spin over them the webs, like beautiful silk ropes, by which they hold on to rocks and other things. It is a case of mussels versus oysters, and unless man interferes the oysters get the worst of it. Then there is the Crow Oyster which is only so far an enemy that it takes up room the oysters should occupy. The crow or

FIG 3.

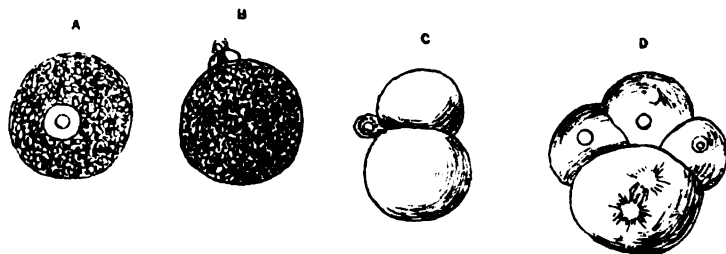


FIG 4.



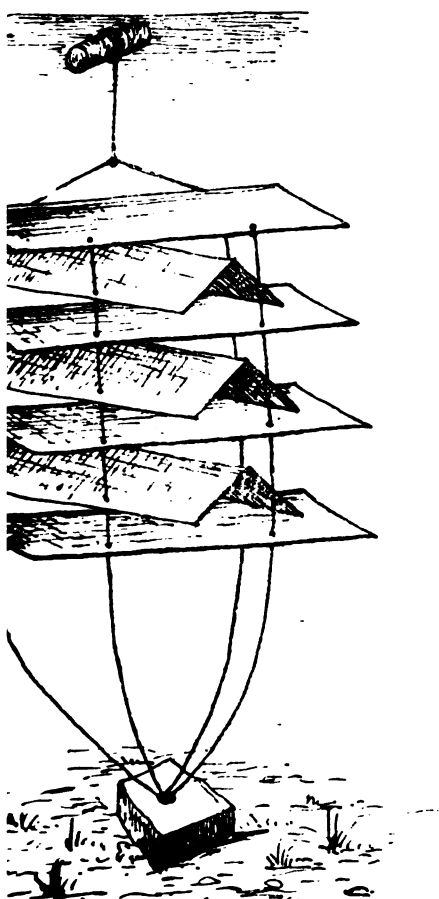


FIG 5.

CORRECTION: THE
PEN IN

saddle-back oyster is almost poisonous. It is very common in Poole Harbour and in some Irish oyster beds. It can be easily distinguished from the common oyster by the small hole at the bottom of the lower shell by means of which it fixes itself.*

The "Sea Burrs" or Echini also eat the young oyster. Then the "Dog Whelk" or Whelk Tingle is a very grave enemy. It is a little creature, but like many other little creatures it has a very sharp tongue, and with this tongue it bores through the shell and in a few hours can do a great deal of mischief.

But perhaps "Five Fingers" or Star Fish are the most formidable of all its enemies. They open the oyster by catching hold of the shell with their five fingers, protrude their stomach in between the valves of the oyster, eat up the animal and leave it what is technically called a 'clock.'† The Five Fingers are very wary too, for when the dredgers are about, and one of the main objects of dredging is to keep the oyster beds free from Five Fingers, then they quietly take their departure. But besides its living foes the oyster has some inanimate enemies and against these it is almost powerless. Sand for instance is very fatal to an oyster bed, it gets in between the shells and blocks them open. Mud acts in a similar way and though you will sometimes find that the oyster has tried to form an inner shell, you will not often find that it has succeeded. If the sand and mud continue to accumulate, the oysters are doomed. Snow and chilled water are also fatal, especially to the young. The oyster cannot stand the cold. A heavy snowstorm in March, 1876, destroyed nearly £4000 worth of oysters in one bed alone, in the river Roach. Land floods too will of course destroy the oyster. He objects to fresh water quite as much as some young children do. Wind and waves again are very destructive to young oysters, they drive them about before they have finally settled, batter them against the shore and destroy their tender shells.

So that you see breeding oysters is not an easy task. An oyster bed to be successful must be kept free from five-fingers, dog-whelks, crow oysters, it must not be exposed to severe cold or to land floods, must not be near sand dunes, sand banks, or a muddy bottom. Still, when oyster culture is successful it is a very profitable business, it is said that 800,000,000 oysters or £4,000,000 worth at the very least are annually provided for the London market.

The most important of the fisheries that contribute this astonishing amount are at Holy Island, North Cumberland, where there are some very fine

* Some specimens of the Crow oyster, kindly presented by Captain Edward Johnson, were exhibited on the table.

† See picture in Scribner, for September, 1881.

fat oysters, in the Wash where there is a large tract of shallow water which is carefully cultivated by the Corporation of Boston and Lynn,—it is not however until we reach the Orwell at Ipswich that we get into the true oyster country—in the Colne at Colchester, the Crouch and Roach in Essex,—at the last the oysters have green beards—at Southend there is too much sand about, but some are grown—at Whitstable, the palace of oysters, these are all famous. At Ramsgate and Margate deep sea oysters are obtained. At Selsea Bill too, singularly enough ever since there was a wreck there, oysters in greater or less numbers have been found—In Chichester Harbour, off Langton Island and Hayling Island, where there is a breeding establishment on the French plan, which I had arranged to visit but was unfortunately prevented—at Portsmouth where the oysters are very fine, and also at Newport, Isle of Wight. At Plymouth on the other hand they are but second-class, fit only to bring to London and fatten. Falmouth is a first-rate place for oysters, unfortunately the beards and bodies are green as green paint, and they taste like a corroded halfpenny. This is no doubt due to the copper coming down in solution from the mines. Still Falmouth is a good breeding place, and the oysters are taken elsewhere to fatten. They soon lose their copper taste when taken to the other side of England and then fatten remarkably well. The Milford Haven oysters are the next best to our own,—they are pure natives. At Helston in Cornwall, it is warm and quiet and the oyster fisheries are very successful. In Cardigan Bay there is too much sand for oysters, but at Beaumaris on the other hand there are famous oyster beds. The Irish oysters are laid there to fatten for the Liverpool market. Liverpool, be it noted, is said to be the best place in England for studying oysters,—for they are brought there from all parts of the kingdom. At Shoreham too, near Brighton, there is a good storing-place.

I will not pursue the oyster round Scotland, what I have already said will probably give you a sufficiently complete idea of its homes and haunts. I hope I may have mentioned some place you are some of you practically acquainted with and that you will be able to supplement my sketch with illustrations from your own experience.

I may add however with regard to Scotland that those from the West always have black beards, just as those from the river Crouch in Essex are green-bearded. Englishmen do not fancy green-beards, supposing though erroneously that green is always a sign of copper, accordingly from the Crouch they are sent across to France where we meet with them as 'les huîtres, verts d'Ostende' but they are really English born and bred. These English-born, Ostend-fattened oysters are said to travel better and further than almost any other kind of oyster, they are accordingly much prized at Berlin, Moscow,

and even Odessa. The Irish oyster, too, is black bearded, so also are American and Lisbon oysters. The cause of this peculiarity of colour is not well understood, it no doubt depends in some way on the food they feed on, and the soil they live on, that is in both cases on the constituents of the water in which they live. So completely is it the fact that the oyster varies with the character of its bed that the dredger has been known to determine his exact position when he has lost his bearings on a dark night or in a fog by the shape, size or colour of the oyster brought up by the dredge and by such indications to steer direct for his harbour. The green bearded oysters are not green however the whole year round, they generally lose the colour in April and assume it in October.—It is said too that this green colour can be produced at any time in three or four days by putting oysters in shallow pits in the salt marshes where the water is not more than three feet deep and where the sun has great power. One witness before the House of Commons committee said it was due to the crow-silk weed. A curious thing about the American oyster is that all their shells have a black spot in the middle.* This spot is just under the muscle. Fig. 4 is a drawing, made by Mr. Baker, of a section of one of the valves of an American oyster that our stone-mason cut in two for me through the hinge. It is interesting because it shows how the muscle gradually moves away from the hinge as the oyster increases in size; the black line being in fact a record of the forward movement of the spot, that is to say of the muscle.

The Bay of Biscay oysters have another and a very unpleasant peculiarity. You have to be very careful not to break the double shell most of them possess, for it contains sulphuretted hydrogen, which gives a very bad smell and flavour to the oyster and poisons the stomach of any one who eats them.

Oysters are classified as natives, seconds and commons.

The natives, also called *clumps* in the trade, are thoroughbred, with light deep shells, and hold a larger proportion of meat as compared with shell than any other oyster in the world. Their geographical range is from Harwich or thereabouts in the North to Margate in the South. There are some beauties grown in the middle of the Thames estuary, called the Ham or Hem, as good to look at as they are delicious to eat, Professor Buckland I think it is describes them as the handsomest oysters there are.

The Irish oysters are Seconds. After they have been laid down at Whitstable they lose their black beards and grow fatter, but their shells are too crinkled for them ever to rise to be natives—good enough for sauce, but not fit for the table.

The Commons you will find on any oystermonger's stall, they are generally deep sea oysters and come either from France or from the Dogger

* Examples were shown.

Bank, they bear about the same relation to a native as a cart-horse does to a race-horse.

Though I do not mean to say anything about the gastronomy of the oyster. I will leave that to any ladies who may be willing to contribute information on the varied attractions of fried oysters, stewed oysters, scooped oysters, etc., still before passing on to its cultivation I may say a word or two about the oyster as an article of food.

Just now at all events the oyster is very expensive dist. After careful examination it has been calculated that when oysters are 2s. a dozen, the meat in them costs at least 8s. a lb. The price has risen amazingly during this century and seems to be still rising. In 1838 Whitstable oysters fetched on an average 19s. a bushel, in 1870, the last year I have a return for, they averaged the astonishing price of £10 2s. Od. a bushel.

The oyster as we should expect contains a great deal of water of the same composition as sea-water, consisting of hydro-chlorate of soda, hydro-chlorate of magnesia, sulphate of lime, sulphate of soda and sulphate of magnesia. It also contains a great deal of phosphate of iron and lime, but above all of osmazone or creatine which you cannot see, but which has been described as the smell of roast beef, practically it is the essence of meat. The oyster also contains a certain quantity of gelatine and mucus, and this it is that makes it so digestible, and finally it contains an animal matter of which phosphorus is the most important element, and as phosphorus is the most brain-making form of food we can take, that no doubt is why those who use their brains much always find that oysters will bring them up to the mark better than anything else. The oyster should always be served in the round shell because the water in the oyster shell contains a great deal of this osmazone and phosphorus; it is said to contain the white blood of the oyster, shed when the oyster was opened; it is very digestible and very tasty. It is this water in the shell of course, as indeed I have already implied, which enables us to transfer them from place to place, and keep them until they are wanted. They will live in fact as long as they have enough to keep their gills moist,—how long this is, opinions strangely differ. One authority says that if properly packed they will live out of water six weeks. Another sneers at that, and will not give them half the time, while another says a full grown oyster will not be fit to eat when he has been one week out of the water, and a fourth, Professor Buckland, gives him ten days in moist weather.

The fisheries may be divided into four classes:—

- a. Natural Banks, where all we do is so to use our knowledge as to give the oyster a fair chance, to protect the beds in fact by suitable dredging at certain seasons, and to assist the spat when it is born. Such for instance as the

Solent, Milford, Tenby, Bristol, Beaumaris, Herne Bay, Langston, Emsworth, &c.

- b. Banks partly natural and partly artificial, as for instance Whitstable, Colchester, Ipswich, Harwich, Brading, Cowes, Newton, Hamble, Herne Bay, Feversham, Paglesham.
- c. Cultivation in inclosed spots, as Hayling, Lymington, Brading, Cowes, Newton, Herne Bay, Fagborough, New Brompton, and above all Lake Fusaro, in Italy.
- d. Foreshore cultivation. This is characteristic of France and Italy,—we have no example in England, and it would not be of any use trying to introduce it. We grow turnips where they grow vines, and the difference of temperature is fatal to oyster-breeding in shallow pools on the shore.

I will not enter into minute details of each of these classes,—if this were a Committee of the House of Commons and I were under examination by the Chairman, our esteemed President, or if I thought it at all probable I was addressing any who were likely to take to oyster-culture as a branch of culture more interesting than that we are devoted to here, I should perhaps have to distinguish carefully, but under present circumstances I think I shall do well to avoid too careful a classification and too great minuteness of detail.

The breeding season begins pretty accurately when the letter E disappears from the name of the month, and ends about the time when it reappears—in other words as a general rule the close time lasts through May, June, July, August, and during these months the oyster is positively unwholesome.

The technical name for the young of the oyster is *spat*,—how often an oyster breeds during its life-time is not as yet known, but it does not begin till it is three or four years old, and it is not I think generally supposed that it spats every year,—when it does the number of its progeny is something portentous. A healthy oyster under favourable circumstances has been known to contain 829,665 spats.

The eggs are hatched between the folds of the mantle, and from its birth the young oyster is quite perfect, shell and all,—a little miniature of its parent. The whole 800,000 odd are not I need scarcely say all produced at once, but apparently in detachments; when the number in the mantle becomes inconveniently large the parent sends them forth upon the waters in a very unceremonious but very expeditious way. By a sharp snap, by quickly opening and shutting his valves he produces a sudden flow of water which washes through the gills and carries the young oyster away with it,

in fact he spits them out—hence, I imagine, the name *spat*. They come out in a great cloud, like the smoke of a railway engine on a frosty morning. The whole process takes about a week, not more.

When the spat* leaves the oyster it at once rises,—when first born it seems to have some power of locomotion, which it afterwards loses, in consequence, it may not unreasonably be supposed, of its shell's becoming inconveniently and unmanageably large in proportion to its body. This locomotion, such as it is, is effected by what has been called a swimming pad, and which looks like a ciliated coronet; it is really nothing more than the protruded lobes of the mantle (Fig. 3, f.g.) One of the witnesses before the House of Commons positively asserted that he had known oysters turn over when laid on the wrong side. I can find no confirmation of this, and my own oysters have so far sturdily resisted every form of blandishment and provocation likely to induce them to perform this feat. "When put in a large glass of water," says Mr. Buckland in his evidence, "the spat will remain mostly at the bottom, moving about in a very rapid way like the ants when you stir up their nest. Then from time to time they float to the top with a wavy motion, where they float about for some time like the whirligig beetles on the tops of ponds. Then again down they go again and apparently close their shells when they sink for they go down like a leaky bottom. They get very lively towards the middle of a hot June day, when the sun is shining right full upon them, but they show the effect of cold at once."

This power of moving about is not however long retained,—after a time swimming with open shells and extended mantle uppermost it will cling to some clean hard substance that it comes in contact with. It then secretes over that part of the substance which it touches a coating of the same material as that of which its shell is composed. Successive layers follow, and if not moved the once free oyster becomes stationary and a fixture. If moved however when young, it will again attach itself.

The first care of an oyster farmer then is to keep the ground clear of shrimps, and all enemies whether animate or inanimate likely to destroy the spat. The next is to provide good clean suitable material as *Cultch*, the technical name for the substance to which the young oyster clings.

For this various substances have been adopted, some apparently answering in one place, some in another. Fig. 5 represents a very common kind. On one occasion when there was a very heavy fall of spat, Professor Buckland says he used for *Cultch* all the tiles of a Church, and then had scarcely enough; and as a single tile would catch—or clutch—I am inclined to

* On the table there were some specimens of last year's spat kindly contributed by Captain Edward Johnson.

think cultch is only clutch, though I cannot find the word in the dictionary—300 little fellows (120 of them extend about an inch); you may imagine what a harvest of spat that was. When they are one year old they are removed to fattening grounds. It is not often that the same beds are equally favourable to breeding and fattening.

At Hayling Island hurdles and twigs are used. Large stones are sunk with bundles of twigs fastened to them, the spat rises and is caught by the twigs and hurdles, and if the wood is clean it settles there. At another place large rough stones are sloped one against the other, and the spat fastens on to the stones. Old oyster shells too are much used. Oyster farmers groan over the way some people burn the oyster shells after the animal has been eaten. They should be thrown out on to the dust-heap, and carted away as rubbish. Then the dustman will separate the oyster shells and sell them to the oyster-farmer. At Poole the oyster shells have been turned to a different but not less valuable use. By an Act of Parliament the Poole fishermen who open the oysters at sea and pickle them on the spot for transportation, are obliged to throw the oyster shells on to the strand, and there in course of time they have formed a strong barrier against the waves of the sea.

At the Medina oyster fishery near Cowes, the only one I have actually seen, wooden trays are used. When I was there the men were busy cleaning the trays for this year's spat.

In County Clare an old hamper was once tried, and it proved a great success. Very often, of course, in spite of every precaution, the spat falls altogether. For instance, at Waterford much trouble was taken with an excavated pond, in an unusually favorable situation, into which sea-water could be admitted when required, 20,000 oysters were laid down, and every variety of cultch prepared, but for three years, in spite of all the trouble and expense, not a single spat would adhere to the cultch, and after that time I fancy the experiment was abandoned.

The oyster culture of Lake Fusaro in Italy, not far from Naples, is especially interesting, because it has been carried on successfully for at least 1900 years, and is no doubt the source of all the oyster culture of Europe. They seem there to have two plans:—i. Fascines are suspended some few feet above the bottom to catch the rising spat; ii. Artificial heaps of stones are thickly surrounded with stakes, and on these the oysters become fixed, and when they are well covered, or the spatting season is over, the stakes are drawn or the stones lifted for the purpose of detaching the produce. One more example—and that on an extensive scale of foreshore cultivation—and I have finished.

Arcachon is in the Bay of Biscay, a few miles South of Bordeaux. It lies in a land-locked basin of about 30,000 acres, is entirely uncovered during

the ebb-tide, and the oysters can therefore be easily watched. The experiment is an especially interesting one, because nowhere else have the regulations of the French government been so carefully adjusted to the requirements of the beds, and nowhere else have the regulations been so carefully and consistently observed, and the result has been most encouraging. Oyster culture was started there in 1859 I think, and though not immediately successful, the number sold amounted after three or four years to nearly three millions a year. In 1870—1, something less than 5,000,000 oysters were taken up; the area of cultivation was then reduced, and the result was that in 1874—5, there was a harvest of forty millions, while in 1875—6 altogether from artificial *parcs* and natural banks no less than 196,885,450 were exported. The oyster beds* are reservoirs which communicate with the sea by means of canals. They are made with stones, and the water is admitted at high tide and kept in at low tide by means of locks. The bottom is paved to keep out the mud as much as possible, and when the water is let in it is done very carefully lest particles of mud should be driven into the shells. The system of culture is briefly as follows:—The spat of the year is cleaned from the tiles in October, and then laid down in the enclosed pits, where it settles down for the winter. In the spring the oysters are sorted according to size and laid down again less thickly in fresh pits, the bottom of which is covered with clean gravel, which is renewed from time to time. The pits are carefully cleaned every month from the mud brought into them by the tide. In these pits the oysters are kept till they are two years old, if they are to go elsewhere to fatten, or till three or four years old if they are to go direct to the dealers. In the latter case before being packed they are placed very thinly for a couple of months in still cleaner pits, and finally are put for a few days on a sloping bank of gravel, where they are washed by fresh seawater at every tide. Gravel is, however, expensive: it has to be brought by rail from Bordeaux, and sand does not answer the purpose, it sinks too readily into any mud there is, and does not keep the beds clean; accordingly it is only the capitalists who are really successful, the small cultivators for whose benefit the *parcs* were originally organised, have had for the most part to abandon their farms. The letters from M. de Rochebrunne, a Captain appointed to look after these fisheries, to the famous M. Coete, the Inspector General of French Fisheries are interesting in their proof of the increasing success of the oyster. One of them is interesting for another reason. It is dated 27—6—71, and in it M. de Rochebrunne, after saying that he has put down 68,000 tiles, that he can already count as many as fifty spat on many of the tiles, and that he anticipates a larger harvest than ever, adds

* Various plans were exhibited of these and other oyster parks in France.

that he would have been much more successful if he could have got to Arcachon earlier in the year, but he was kept away all May by the vote of the *plébiscite*. The following July, if you remember, war was declared. Later in the year he writes again, and can scarcely find words to express his delight at his success. "It is a very manna sent down from heaven" he says, and he calculates that on the two millions of tiles he has altogether put down that year, and on the other collections there are at least 80 millions of young oysters, perhaps even more, he is not afraid to say from 100 to 150 millions. This was only from the '*parcs*.' The produce of the natural banks is not included.

I have passed over a great many subjects which the practical man would think important, I have said nothing about the kind of soil most favourable, I have not burdened you with tables of temperature, nor on the other hand have I given way to the temptation of saying anything about what may be called the literary history of the oyster, though the allusions, ranging from Juvenal to *Punch*, would of themselves make an interesting chapter, but I have tried to choose those parts of a somewhat extensive and complicated subject which were both most likely to be remembered and were best worth remembering, which would give you an intelligent interest in any oyster fishery you may ever happen to come across, and above all which would help to impress on your mind as on my own that an animal we are accustomed to look on merely as a delicacy is really if simple, very wonderfully organised, and that the oyster is only one more illustration of the truth which our Society exists to proclaim that every detail of what we call nature is worthy of honest and intelligent study.

UN-NATURAL HISTORY.

BEFORE plunging into our subject it may appear that some few words of apology are due to the votaries of science we see before us, since your pursuits deal with natural history, while the title of our paper is wide as the poles assunder from this. On full reflection, however, we see no cause to regret the subject of our present remarks, for all science is a gradual growth, and even as travellers as they toil up a long ascent turn round and mark with satisfaction all the road that lies between them and their distant starting place, and derive farther encouragement from the sight to press onward to the yet unknown, so we in this our day and generation may compare ourselves in no ostentatious and offensive way with the men of the past, and gain renewed courage in the future, as we leave their ancient landmarks far behind us. Shame indeed would it be to us had we not thus advanced, for our opportunities of acquiring knowledge are immeasurably greater than those of the men of some two or three centuries ago, or even of our own grandfathers. The printing press multiplies useful knowledge, the power of steam transports us to the ends of the world, while electricity flashes instantaneously from continent to continent the results of antipodean research, or enables the daily paper on the morrow's breakfast table to describe the phenomena of the eclipse that cast its band of shadow but a few hours ago across the sultry plains of Hindustan. Then again the mechanical genius, no less than the philosophic, of the country has in these later days brought to perfection all kinds of instruments, balances so true that infinitesimal portions of material can be estimated, scales so minutely accurate that the finest shades of subdivision can be registered, to say nothing of the telescope that enables us to peer into infinite space, seeing ever new wonders at each increasing stride, until our earth shrinks and shrivels by comparison into utter nothingness, or the microscope that at the other end of the scale reveals to us the world of life that throngs the water-drop. Verily it is a grand world that we live in, and we owe much to the science that reveals its wonders to us, as we stretch and strain our thoughts to bridge the interval between the infinitely minute creatures that throng in countless myriads each wayside pool to the infinitely remote suns that circle through the ages round the footstool of the Eternal, creatures that a century ago no human eye had ever seen, glorious orbs of light that a century ago had shed their radiance on no mortal sight. It may seem that there is an almost equally remote distance between the small Marlburian as he pants after his first Red Admiral and the philosopher who weighs the density of Jupiter, or peers by means of the spectroscope

into the composition of far-distant worlds, but the difference after all is only in degree and not in kind, for both are votaries of one pursuit, both are striving to learn something of all the glorious wealth of nature, and though the one may be but at the beginning, assuredly the other is very far from having reached the end, for we all must be familiar with the assertion of Newton as his life drew to its close, that he was but a little child picking up a few pebbles on the shore, while all the great unknown ocean lay beyond. Such Societies then as the present have our heartiest sympathy, and when your worthy president, in his search for papers, invited me to do something for the Natural History Society, the will, at least, was promptly forthcoming. Other pursuits call for the greater part of my time, and the idea of writing a formal paper is rather an alarming one, but if you will kindly for the sake of the will look leniently on the deed, I will, without further preface, give you some few examples of the natural history that our forefathers believed in. The first book I take from my shelf is entitled "A Description of 300 Animals." No one person appears on the title-page as author, but it is stated that it is extracted from the best authorities, and adapted to the use of all capacities. It is also illustrated with copper-plates "whereon is curiously engraven every beast, bird, fish, serpent, and insect, described in the whole book." The word "curiously" is very happily chosen, and most happily describes the extraordinary nature of the illustrations. The preface shows us that the primary intention of the book was the instruction and entertainment of the young, and after wading painfully through the cumbrous Roman figures, the long array of O's, X's, and the like, we find that the date of the treatise was 1786 or less than a hundred years ago. Let us then dip in here and there into it and see what "the best authorities" could teach my grandfather and your great grandfathers when their youthful minds would know something of the wonders of creation. The lion, as the king of beasts, heads the list, "he is generally of a dun colour, but not without some exceptions, as black, white and red, in Ethiopia and some other parts of Africa." The red lion then it would appear is no more creation of the licensed victualler or Garter king-at-arms, no mere fancy to deck a sign board withal or emblazon on a shield of honour but a living verity, and we may pause to remark that almost all the most wonderful things in the book have their home in Africa, not as now the play ground of the Royal Geographical Society, but an unknown land full of wonder and mystery, of which nothing is too wonderful to be impossible. We are told too that the lion sleeps with his eyes open and many other curious details follow. On the next page the unicorn is in all sober seriousness described—"His head resembles a hart's, his feet an elephant's, his tail a boar's and the rest of his body a horse's. The horn is about a foot-and-a-half in length, his voice is like the lowing of an ox, his

horn is as hard as iron and as rough as any file. Great virtues are attributed to the horn, as the expelling of poison and the curing of many diseases. The unicorn is very familiar to us as one of the supporters of the royal arms, but the form we know so well does not altogether agree with that described. The heraldic unicorn is in all respects a horse save and except the horn, while our old author tells us of the head of a stag and the feet of an elephant. The creature is sometimes referred to in our English version of the Bible and has thus become one of the animals introduced in Symbolic and religious art. In some of the passages it would clearly seem to indicate that even in those very early days dealt with in some of the books of the Bible there was a general belief in some such creature, while in others probably the word is rather introduced in error by our translators, an error that may very well be pardoned when we find the animal gravely described in the much more recent book that has prompted our paper. In the book of Job, the earliest in point of time in the whole Bible, the belief in some such animal seems very distinctly indicated in the words "Will the unicorn be willing to serve thee or abide by thy crib? Canst thou bind the unicorn with his band in the furrow or will he harrow the valleys after thee?" In the 92nd Psalm the peculiar feature that gives the creature its name is especially referred to in the words "my horn shalt thou exalt like the horn of an unicorn." The reference is always to some wild and powerful animal, thus in Exodus we read "his horns are like the horns of unicorns" and again in one of the psalms we find David crying—"Save me from the lion's mouth, for thou hast heard me from the horns of the unicorns" Other passages might be quoted but these will amply suffice to indicate the very early belief in some such creature. The form is frequently seen in the earliest Christian art, as in the catacombs of Rome, the havens of refuge for the living and the resting places of the dead followers of the new faith.

For some reason that we cannot now discover the unicorn was an especial favourite with the Scotch heralds, and it is from them that we derive it in our royal arms. Before the union of the two monarchies the supporters of the arms of the English monarchs had been very various, though in almost every case a lion had been one of the two employed, while in Scotland for several reigns before the amalgamation of the two counties the supporters had been two unicorns. It was very naturally arranged therefore when the two kingdoms were fused together on the death of Elizabeth that the joint shield should be supported by the lion of England and the unicorn of Scotland. I may remind too the coin collectors amongst my audience that the creature freely occurs as a device on the Scottish coinage, one piece especially is by collectors called the unicorn, from the conspicuous introduction of the national device.

We have already indicated that potent virtues were believed to reside in the horn of the unicorn. In the *Comptes Royaux* of France in 1391 we find a golden cup with a slice of this horn in it for testing the food of the Dauphin and again in the inventory of Charles Vth — “Une touche de licorne, garnie d'or, pour faire essay.” Decker again, in 1609 speaks of “the unicorn, whose horn is worth a city.” In Mrs. Bury Palliser's most interesting work of ‘historic badges and devices’ we find an illustration of the standard of Bartolomeo d'Alviano. He was a great champion of the Orsini family and took a leading part in all the feuds that devastated Central Europe during his life-time. His standard bears the unicorn, surrounded by snakes, toads, and other reptiles then rightly or wrongly held poisonous, these he is moving aside with his horn and above is the motto “I expel poisons.” He, d'Alviano of course, being the lordly and potent unicorn, his foes the creeping things to be driven from his face.

“The wolf is a very ravenous creature, and as dangerous to meet with, when hungry, as any beast whatever, but when his stomach is full, he is to men and beasts as meek as a lamb. When he falls upon a hog or a goat or such small beasts, he does not immediately kill them, but leads them by the ear, with all the speed he can, to a crew of ravenous wolves, who instantly tear them to pieces.” We should have thought that the reverse had been more probable, that the wolves that had nothing would have come with all the speed they could upon their more successful companion, but if the old writer's story be true it open out a fine trait of unselfishness in the character of this maligned commund. The 13th animal is the “Rompo” or Man-eater; he is “so called because he feeds upon dead men, to come at which he greedily grubs up the earth off their graves as if he had notice of somebody there hid. He keeps in the woods: his body is long and slender, being about three feet in length, with a long tail. The negroes say that he does not immediately fall on as soon as he has found the body but goes round and round it several times as if afraid to seize it. Its head and mouth are like an hare's, his ears like a man's, his fore-feet like a badger's, and his hinder feet like a bear's. It has likewise a mane. This creature is bred in India and Africa.” Concerning the buffalo we read, “it is reported of this creature that when he is hunted or put into a fright he'll change his colour to the colour of everything he sees; as amongst trees he is green, &c.” The Manticora is one of the strange imaginings of our forefathers; in the illustration it has a human head and face and a body like that of a lion, a thick mane covers the neck, its tail is much longer in proportion than that of a lion and has at its extremity a most formidable collection of spiky looking objects, these in the description are said to be stinging and sharply pointed quills. He is as big as a lion, “His voice is like a small trumpet.

He is so wild that it is very difficult to catch him, and as swift as an hart. With his tail he wounds the hunters whether they come before him or behind him. When the Indians take a whelp of this beast they bruise its tail to prevent its bearing the sharp quills; then it is tamed without danger."

The Lamia too is an extraordinary creature and one that our not remote forefathers seems to have thoroughly believed in, for though the author says that there are many fictitious stories respecting it, he goes on to describe it and gives an illustration. It is thought to be the swiftest of all four-footed creatures, so that its prey can seldom or never escape it. It is said to be bred in Libya and to have a face like a beautiful women, while its voice is the hiss of a serpent. The body is covered with scales. The old author tells us that they sometimes devour their own young and we may fairly hope that this cannibal propensity of theirs is the cause of their disappearance. In earlier times men believed in a monstrous spectre called an Empusa. It could assume various forms, and it was believed to feed on human flesh. The Lamiae who took the forms of handsome and graceful women for the purpose of beguiling poor humanity, and then sucked their blood like vampires and devoured their flesh were one form of Empusa. The belief in some such creature seems to have been wide-spread: the myth of the Sirens is for example very similar in conception. In Mansfield Parkyns' "Life in Abyssinia" we read "there is an animal which I know not where to class, as no European has hitherto succeeded in obtaining a specimen of it. It is supposed by the natives to be far more active, powerful, and dangerous than the lion, and consequently held by them in the greatest possible dread. They look upon it more in the light of an evil spirit, with an animal's form, than a wild beast; they assert that its face is human." We learn however, from the rest of the description, that this creature possesses itself of its prey by force alone, the human face is one further feature of terror, but does not, as in the previous case, serve to beguile mankind and lure them by its beauty to their fate. The stag is said to be "a great enemy to all kinds of serpents which he labours to destroy whenever he finds any, but he is afraid of almost all other creatures." The tusks of the wild boar, we are told, cut like sharp knives when the animal is alive, but lose their keenness at his death. It is said when this creature is hunted down his tusks are so inflamed that they will burn and singe the hair of the dogs. The wild ox has a tongue so hard and rough that it can draw a man to him, "whom by licking he can wound to death." The elephant, we are told on the same authority, has two tusks, "One of them it keeps always sharp to revenge injuries, and with the other it roots up trees and plants for its meat. These they lose once in ten years, which, falling off, they very carefully bury in the earth on purpose that men may not find them." The liver of a mouse our forefathers believed to

increase and decrease with the waxing and waning of the moon, "For every day of the moon's age there is a fibre increase in their liver." This rash and random assertion it would be manifestly impossible either to prove or disprove, though one may have one's own strong opinion on the matter. It would be necessary to kill the mouse to count the aforesaid fibres, and having killed it the morrow's extra age of the moon would bring no added fibres to the victim of our credulity. Presently we come to the Potto, a creature that is probably the same as we now call the sloth. The illustration shows us a most hopelessly helpless-looking animal, and in the description that accompanies it we are told that a whole day is little enough for it to advance ten steps forward. We are also informed that when he does climb a tree he does not leave it until he has eaten up not only the fruit but all the foliage, when "he descends fat and in good case," but before he can get up another tree he loses all the advantages of his previous good quarters and often perishes of hunger. Eighty-seven quadrupeds are dealt with, so it will be readily seen how little we have drawn upon the wealth of information the book affords. Amongst various curious particulars concerning what the newspaper reporters would call the feathered tribe, we learn that the plumage of the kingfisher is so brilliant in colour as to injure the eyes of those who dwell too long on its splendour, and that "the lion is afraid of a cock, cannot endure the sight of him, yea, is terrified by his very crowing." Book IV of the treatise is devoted to the consideration of serpents and insects. Amongst serpents and insects the dragon naturally takes the place of honour. The writer evidently has his doubts and carefully qualifies his description by a free use of the responsibility-evading formula "it is said." He gives three illustrations, one of them represents a biped monster crested and winged, the second has lost his legs though he retains crest and wings, while the third creature is of serpentine nature, has neither wings nor legs, and only differs from the serpent forms in the book by the addition of his crest. The description runs as follows:—"The dragon, as described in the numerous fables and stories of several writers may be justly questioned whether he really exists. I have read of serpents bred in Arabia, called Sirenas, which have wings, being very swift, running and flying at pleasure; and when they wound a man he dieth instantly. These are supposed to be a kind of dragons. It is said there are divers sorts of dragons or serpents that are so-called: which are distinguished partly by their countries, partly by their magnitude, and partly by the different form of their external parts. They are said to be bred in India and Africa; those of India are much the largest, being of an incredible length, and of these there are also said to be two kinds, one of them living in the marshes, which are slow of pace and without combs on their heads; the other in the mountains, which are bigger and have combs,

their backs being somewhat brown and their bodies less scaled. Some of them are of a yellow fiery colour, having sharp backs like saws. These also have beards. When they set up their scales they shine like silver. The apples of their eyes are (it is said) precious stones, and as bright as fire, in which it is affirmed there is a great virtue against many diseases. Their aspect is very fierce and terrible. Some dragons are said to have wings and no feet; some again have both feet and wings; and others neither feet nor wings: and are only distinguished from the common sort of serpents by the combs growing upon their heads and by their beards. Some do affirm that the dragon is of a black colour, somewhat green beneath and very beautiful, that it has a triple row of teeth in each jaw, that it has also two dewlaps growing under the chin, which hang down like a beard of a red colour; and the body is set all over with sharp scales; and on the neck with thick hair, much like the bristles of a wild boar." It will be seen by the foregoing that the imagination of our ancestors was allowed free play, abundant variety of form, magnitude, colour, and so forth being possible. We need scarcely remind our readers that our patron Saint, St. George of Cappadocia, was a distinguished dragon-slayer, and in Hungary in the middle ages the creature gave a title to an order of knighthood, that of "the dragon overthrown." This was established in the year 1418, to perpetuate the memory of the condemnation of John Huss and Jerome of Prague by the Council of Constance for heresy, and to denote the overthrow of the doctrines these men propagated in Hungary, Bohemia, and elsewhere in Germany, and for which they were ultimately burnt at the stake. The badge of the order was a dragon prostrate. The dragon is largely employed in Christian art as a symbol of the evil principle; and such an application naturally arises from various passages in the scriptures as "The great dragon was cast out, that old serpent, called the devil and Satan, which deceived the whole world." Pharaoh as the enemy of God's chosen people, is in like manner compared to a dragon—"Thus saith the Lord, behold I am against thee, Pharaoh, king of Egypt, the great dragon that lieth in the midst of his rivers." An enchained dragon is an attribute of St. John of Rheims, and another is placed at the side of St. Romanus, and even the gentler sex claim the allegiance of the creature or signalise their triumph over it. It is thus seen in representations of St. Victoria and St. Martha. It would be beside our present purpose to go into the various legends that render these attributes appropriate, but we may, as a sample of them, just point out as we pass on, that this latter Saint, whom we may naturally take some little additional interest in as she is the patron saint of good housewives, so far travelled beyond the daily round, the trivial task, as to deliver the good people of Marseilles from a terrible trouble by destroying for them a dragon that was ravaging the

country around. As a symbol and attribute the dragon is constantly appearing in mediæval work, as carvings, illuminations, and the like, and we may remind our readers that in the term gargoyle, used in speaking of the strange and monstrous forms often found in our old cathedrals and abbeys doing duty as water-shoots, we get the dragon idea again, as the word is derived from an old French word signifying some such draconic monster. While however we find ourselves thus classing the dragon amongst the mythical and arbitrary forms of the stone carver or the herald we must be careful to remember that its terror had not thus in earlier days lost its sting, for the workman who sculptured it on a capital or thrust its hideous form into any other noticeable position not only regarded it as a symbol but believed very really and truly in its veritable existence. Albertus Magnus gives a long account of the creature, an account altogether too elaborate for us to here transcribe, but its capture according to him is an easy matter enough if one only goes the right way to work. It was fortunately ascertained that dragons are "greatly afraid of thunder, and the magicians who require dragons for their enchantments get drums on which they roll heavily, so that the noise is mistaken for thunder by the dragons, and they are vanquished." The thing is simplicity itself, and rather detracts from the halo of heroism that has hitherto surrounded dragon vanquishers. A man is scarcely justified in blowing his trumpet when he has previously so cowed his antagonist by beating his drum, and deluding its dull brains with his fictitious thunder. Pliny says that the eyes of a dragon, preserved dry, pulverised and then made up with honey cause those who are anointed therewith to sleep securely from all dread of spirits of the darkness. In a mediæval work we are told that "the turning joint in the chine of a dragon doth promise an easy and favourable access into the presence of great lords." One can now only wonder why this should be, all clue and thread of connexion between the two things being so hopelessly lost. We must not however forget that, smile now as we may at this, there was a time when our ancestors accepted the statement with the fullest faith, and many a man who would fain have pleaded his cause before king or noble bewailed with hearty regret his want of draconic chine, the "turning point" of the dragon and of his own fortunes. Another valuable receipt—"Take the taile and head of a dragon, the haire growing upon the forehead of a lion, with a little of his marrow also, the froth moreover that a horse fomethe at the mouth who hath woon the victorie and prize in running a race, and the nailes besides of a dogs-feete : bind all these together with a piece of leather made of a red deers skin, with the sinewes partly of a stag, partly of a fallow deere, one with another : carry this about with you and it will work wonders." It seems almost a pity that the actual benefits to be

derived from the possession of this compound are not more clearly defined as there is no doubt that a considerable amount of trouble would be involved in getting the various materials together, and the zeal and ardour of the seeker after this wonder-working composition would be somewhat damped by the troublesome and recurring question—Wherefore? Mediæval medicine men surely must have been somewhat chary of adopting the now familiar legend, “prescriptions accurately dispensed,” when the onus of making up such a mixture could be laid upon them. John Leo in his *History of Africa* says that the dragon is the progeny of the eagle and wolf. After describing its appearance he says—“This monster albeit I myself have not seen it yet the common report of all Africa affirmeth that there is such a one.” Other writers affirm that the dragon is generated by the great heat of India or springs from the volcanoes of Ethiopia, and one is tempted to take the prosaic view that this dragon rearing and slaying is but a more poetic way of dwelling on some miasmatic exhalation reduced to harmlessness by judicious drainage; that the monster that had slain its thousands was at last subdued by no glittering spear wielded by knightly or saintly arm, but by the spade of the navvy and the drain-pipes of the sanitary engineer. Father Pigafetta in his book declares that “Mont Atlas hath plenty of dragons, grosse of body, slow of motion and in byting or touching incurably venomous. In Congo is a kind of dragons like in biggnesse to rammes with wings, having long tayles and divers jawes of teeth of blne and greene, painted like scales, with two feets, and feede on rawe fleshe.” I cannot myself help feeling that if I saw a dragon like in bigness to a ram I should so far be disappointed in him. After having had my imagination filled by legend after legend I should look for something decidedly bulkier than that and should feel that he really was not living up to his reputation. Abundant illustrations of the most un-natural history may be found in the works of Aldrovandus: his voluminous works on animals are very curious and interesting, and richly illustrated with engravings at least as quaint in character as the text. His “*Monstrorum Historia*” published in folio at Bologna in 1642 is a perfect treasure house; the various volumes range in date from 1602 to 1668 and are with one exception, Venice, published at either Bologna or Frankfort. If any of you can get an opportunity of looking through them you will find yourselves well repaid.

Returning however to the *Natural History* of 1786 we find, after the account of the Dart, “so called from his flying like an arrow from the tops of trees and hedges upon men, by which means he stings and wounds them to death,” the following description—“The Cockatrice is called the kin; of serpents, not from his bigness, for he is much inferior in this respect to many serpents; but because of his majestic pace, for he does not creep upon

the ground, like other serpents, but goes half upright for which cause all other serpents avoid him, and it seems nature designed him that pre-eminence, by the crown or coronet upon his head. Writers differ concerning the production of this animal. Some are of opinion that it is brought forth of a cook's egg sat upon by a snake or toad and so becomes a cockatrice. It is said to be half a foot in length, the hinder part like a serpent, the fore-part like a cook. Others are of opinion that the cock that lays the egg sits upon and hatches it himself. These monsters are bred in Africa and some parts of the world." In England it would appear, so far as we have observed the matter, that the hens have entirely usurped the egg-laying department and we are therefore spared the mortification of finding that our hoped-for chick has assumed the less welcome form of a cockatrice, for we shall see that the advent of a cockatrice is no laughing matter. The book goes on to tell us that authors differ about the bigness of it, for some say it is a span in compass and half a foot long, while others with a truer sense of the marvellous realize more fully that bulk is a potent element in all such matters and at once make it four feet long. Its poison is so strong that there is no cure for it and the air is in such a degree affected by its presence that no creature can live near it. It kills, we are assured, not only by its touch but even the sight of the cockatrice, that like of the basilisk, is death. After this we can scarcely wonder at a certain vagueness of description, as those who never saw the animal have full license of description, while those, less fortunate, who have had an opportunity of studying from the life have forfeited their own in doing so. The only hope of getting an idea of it would be the discovery of a dead specimen, for we read that "as all other serpents are afraid of the sight and hissing of a cockatrice, so is the cockatrice itself very fearful of a weasel; which after it has eaten rue, will set upon and destroy the cockatrice. Besides this little creature, it is said there is no other animal in the world able to contend with it." We can well imagine the indignant astonishment of the cockatrice after being for years the monarch of all it surveyed when the gallant little weasel, strong in the triple armour which makes a quarrel just, and duly fortified by the internal application of rue, charges boldly home and takes him, monstrorum Rex, by the throat. At the time that our present version of the Old Testament was made there was a sufficient belief in the creature to make the translation of some Hebrew word seem correctly rendered by the word cockatrice, for we read in the book of Isaiah that one sign of the Millennial peace shall be that the child shall put his hand, unharmed, upon the den of the cockatrice, and a little farther on we find the passage "for out of the serpent's root shall come forth a cockatrice, and his fruit shall be a fiery flying serpent." In the 59th chapter the workers of iniquity are described as hatching the

cockatrice egg, and amongst the judgments pronounced upon the impenitent Jews by the prophet Jeremiah we find the verse "Behold I will send serpents, cockatrices, amongst you, which will not be charmed, and they shall bite you." The heraldic cockatrice is represented as having the head and legs of a cock, a scaly and serpent-like body and the wings of a dragon.

The basilisk, to whom also was given the title of king of the serpents, the derivation of the word being too obvious to this scholarly assembly to make it necessary to dwell upon it, was another of the stern, very stern realities of our forefathers, though, like the cockatrice, it has fallen a victim to the march of intellect. Like the monstrous kraken of the Norway seas and the classic harpy or minotaur, down to the sheeted spectre that clanked its chains last century in churchyard or corridor, it has failed to make good its claims to our credence, and even the great sea-serpent that from time to time appears in the columns of the newspapers when Parliament is not sitting will have to appear very visibly elsewhere as well or the scepticism of the 19th century will disestablish it. The basilisk was by some old writers described as a huge lizard, but in later times it became a crested serpent. Exact accuracy on this point was impossible as, like the cockatrice, the glance of its eye was death. Pliny says "We come now to the basilisks, whom all other serpents do flee from and are afraid of; albeit he killith them with his very breath and smell that passeth from him; yea, and by report, if he do but set his eye on a man it is enough to take away his life." Readers of Shakespeare will recall the passage in King Henry Vith, "Come basilisk, and kill the innocent gazer with thy sight," and again where the Lady Anne exclaims to Richard III, with reference to her eyes, "Would that they were basilisk's to strike thee dead." Beaumont and Fletcher too in their "Woman Hater" speaks of "The basilisk's death-doing eye." The only way to kill the basilisk was held to be to cause it to gaze on its own image in a mirror, when its glance would be as fatal to itself as it had hitherto been to others. To effect this, however, evidently presents many practical difficulties, and he must have been a bold man who ventured on so perilous an errand where the least nervousness or mismanagement of the mirror would be literally fatal.

The phoenix had what we may be allowed to call a literary existence amongst the Greeks and Romans, but scarcely became a visible creation of the artist until the mythic fowl was accepted by the early Christians as a type of the resurrection of the body, an association of ideas that afterwards rendered its use very common. According to a tale narrated to Herodotus on his visit to Heliopolis, the phoenix visited that place once every 500 years, bringing with it the body of its predecessor and burning it with myrrh in the sanctuary of the Sun-god, but the version on which the

Christian moral and application is based is somewhat different. It is founded on the old belief that the phoenix when it arrived at the age of 1481 years, committed itself to the flames that burst, at the fanning of its wings, from the funeral pyre that it had itself constructed of costly spices, and that from its ashes a new phoenix arose to life. This belief, which appears to us so absurd, was for hundreds of years as accepted a fact as any other point in natural history. The home of the phoenix was said to be at that delightfully vague address, somewhere in Arabia.

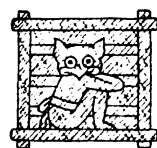
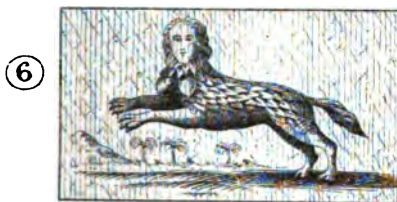
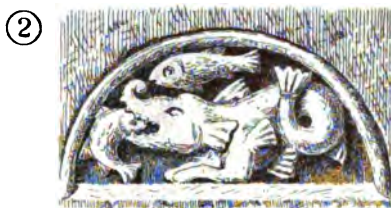
The salamander received its full mythical development during mediæval times though the older writers refer to it occasionally. We see in the writings of such men as Pliny, the first steps taken towards the erection of that fabric of fancy and superstition that in the middle ages was reared on so slight a foundation. Pliny asserts that it is made in the fashion of a lizard and marked with spots like stars, that it is never seen during fair weather, but only in heavy rain, and that it is of so cold a nature that if it do but touch fire it will as effectually quench it as if ice were placed upon it. He moreover declares its poisonous nature, a nature, that according to later writers is so noxious that the mere climbing of the tree by the animal poisons all the fruit so that all who afterwards eat thereof perish without remedy, and that if one enters a river the stream is effectually poisoned and all who drink therefrom for an indefinite date thereafter must die. Glanvil, a learned English Cordelier monk who lived in the 18th century, goes so far as to declare roundly, as though undoubted and historic fact, that 4000 men of the army of Alexander the Great and 2000 of the beasts of burden were lost through drinking at a stream that had been thus infected. It was in the middle ages an article of belief that the salamander was bred and nourished in fire, and we have ourselves been gravely told that if the fires at the iron-works in the midland Counties were not occasionally extinguished, an uncertain but fearful something would be created in them. When represented it is always placed in the midst of flames. This creature was the well-known device of Francis I. of France, and may therefore frequently be met with, carved on the old palaces, government buildings, gateways, &c., in France. We see that the book to which we have already frequently referred as that to which our grandfathers went for instruction puts the poisonous nature of the salamander in the following graphic way—“A man bit by a salamander should have as many physicians to cure him as the salamander has spots.

Like the salamander the griffin was to our forefathers no mere creature of the imagination. Ctesias describes them in all sober earnestness as “birds with four feet, of the size of a wolf, and having the legs and claws of a lion. Their feathers are red on the breast and black on the rest of the body.”

Glanvil says of them "the claws of a griffin are so large and ample that he can seize an armed man as easily by the body as a hawk a little bird. In like manner he can carry off a horse or an ox, or any other beast in his flight. The creature is, if anything, still more terrible when met with in the description given by Sir John Mandeville:—"Thai have the body upward as an egle, and benethe as a lyoun, but a griffonne hath the body more gret, and is more strong than eight lyouns, and more grete and strongere than an hundred egles such as we have among us. For he hath his talouns so large and so longe and grete upon his fete as though thei weren hornes of grete oxen, so that men maken cuppes of them to drinken of." Oriental writers, who appear to have an especial delight in the marvellous, go even beyond this, and the creature becomes with them the roc, the terrible creature we read of, for example, in the wonder'ul adventures of Sinbad the Sailor. Milton introduces the creature very finely in his noble poem, as for instance:—

"As when a gryphon through the wilderness
With wing'd course o'er hill and moory dale,
Pursues the Arimaspiān, who by stealth,
Has from his watchful onstody purloin'd
The guarded gold: so eagerly the fiend
O'er bog, or steep, through strait, rough, dense, or rare,
With head, hands, wings, or feet, pursues his way,
And swims, or sinks, or wades, or creeps, or flies."

We feel that we are yet upon the threshold of our subject: one whole kingdom of nature is yet quite untouched or we should have liked to have dwelt awhile upon the blighting upas tree, the shrieking mandrake root, the herb-basilisk that trodden gently on exhales a sweet perfume, but trampled underfoot engendereth serpents, or the mysterious properties of the moss that grows on dead men's skulls,—but there is abundant material in the lore that has sprung up round the vegetable kingdom for another paper and it is hopeless to try and do anything with it at the fag-end of our present remarks. Fag-end is a perhaps too ominous word to use as it is strongly suggestive of weariness. It may be some consolation to those of our hearers who feel that they have had quite enough of un-natural history for one sitting if we in self-defence assure them that not a hundredth part of the material available has been brought before them and we may fitly conclude by adapting the words we have already quoted from our great philosopher and say that we have but gathered here and there a specimen while the great ocean of mediæval lore stretches beyond us untouched.



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F.E.H.

ILLUSTRATIONS.

1. St. George and the Dragon ; stone carving of Norman work.
2. Stone carving from a Buddhist monument, Bhopal. A cast of the monument is in the South Kensington Museum.
3. 14th Century stone carving : French Gothic.
4. The Sea-lion of Heraldry.
5. The Griffin of Heraldry.
6. The Lamia, from work on Natural History, A.D., 1786.
7. The Manticora „ „ „ „
8. Hindu monster : cast in South Kensington Museum.
9. Dragons : initial letter : mediæval illuminated M.S.
10. Nondescript from an ancient Mexican M.S. in Bodleian Library : presented by Archbishop Laud.
11. Sea monster from the *Monstrorum Historia* of Aldrovandus.

AMBULANCE WORK.

WHEN I first thought of giving a lecture on Ambulance Work or first aid in cases of accident or emergency, I intended to have some demonstrations of a few of the more common means of affording aid. I find that this would be impossible in the time usually allotted to these lectures. I regret this less because I am not without hope that classes for regular instruction in First Aid to accidents may be set on foot. I will therefore bespeak your patience while I endeavour to bring before you a rapid survey of the work, and if time permits I will endeavour to point out the structure of the body, and some of the accidents that are apt to befall it.

From the very earliest ages aid in times of accident or of sickness has held a place in the history of the human race. We read of disease, pestilence and death in the very beginning of man's existence on the earth. And through the long long ages that have rolled away since God first made man in His own Image, a mighty struggle has ever been going on to discover if it were possible an answer to the questions, what is life? and what is death? Leaving these questions to the speculative Physiologist and metaphysical Philosopher, we are this evening to try to make a practical application of the facts and theories that have been gathered together, and taught, alike by our ancestors and by our contemporaries for the relief of the sick and injured. A history of the efforts, I may almost say struggles, that have from time to time been made to bring aid to the wounded in time of war, or to the sick in periods of pestilence would bring to light some of the noblest deeds that have ever been performed by men or women.

First aid to sick and wounded means a great deal, and much depends upon how it is given. Before, however, proceeding to the practical portion of the evening's work it may be well to devote a small portion of the time to a rapid survey of the means that have been devised for the care of the sick and wounded. Hospitals for the sick were unheard of until after the Christian era. Although we read of sickness and its demands in long previous centuries, yet Hospitals were unknown. We read in Scripture of the sickness of various persons and of pestilences that disintegrated cities and towns. We also read of Physicians of note, and whose praise is celebrated both in sacred and profane history, in the ancient book of Ecclesiasticus we have a record of a Physician and the detail of what may be expected of him and how his acts and words have to be held in respect. This chapter has recently been read to you as the lesson for St. Luke's Day,

who is also on record as the Beloved Physician. In ancient secular history we have records of pestilence and of Physicians, but no notice is anywhere given of organized aid for the sick and wounded. In the first ages the healing power was committed mainly, if not entirely, to the order of the priesthood. The cleansing of Lepers and purifying houses were done entirely by the priesthood. And so it appears to have come to pass that in the earlier provision for the sick and wounded, the religious orders were first in their efforts.

One of the greatest triumphs of modern science in reference to the treatment of wounds on the Antiseptic plan, so well developed by Professor Lister and others, was in a manner anticipated in one of the ancient methods of managing wounds. Many a knight and soldier we read of, as having his wounds bound up in the blood and finding his wound healed and the flesh restored on the removal of the bandages after the lapse of some time, to the astonishment of the sufferer and his friends. A remedy which retains its ancient name and deserves its ancient fame, is "Friar's Balsam," so called from its extensive use in monasteries. It is a thoroughly Antiseptic agent, and as such it is admirably adapted to heal almost every description of wound, if such wounds after being cleansed are wrapped up in folds of linen or of lint soaked in the ancient remedy and left quietly for a fairly long time. We also know that the discovery of the properties of cinchona bark and its invaluable principle Quinine, was due to a religious order, and still occasionally is called by its old name, Jesuit's Bark.

The very earliest mention of a hospital is one built at Cæsarea, in the year 870 or 80, by Valens, and also one at Rome by Fabiola, a pupil and great friend of St. Jerome. When monasteries and religious orders were set on foot, the best and largest of them had its infirmary presided over by one of their body called the infirmarius. These housed not only the sick but also infirm and aged persons who had not means of supporting themselves. From such institutions our modern name infirmary is derived. The word hospital had a wider meaning, and is derived from the Latin *hospitalis*, from that also came hospice and hotel. There is still one large hospital that carries the name hotel, that is the Hotel Dieu at Paris, of which I shall have more to say by and bye. Our English hospitals date from the time of Lanfranc, Archbishop of Canterbury, in the end of the eleventh century; an Italian by birth, he came here with the conqueror in whose favour he rapidly rose. Two hospitals were founded by him, one for Lepers and the other for ordinary illnesses.

When the Reformation came, and the monasteries of the kingdom were swept away, the good that they had done in regard to the sick and wounded saved many of them from passing into utter oblivion. The most famous hospitals in London are the relics of monastic foundations. St. Bartholomew's Hospital occupies the site of a once very famous religious

society that had the present church of St. Bartholomew the less, as its Chapel, and who on their then private grounds, provided for the merriment of London in ancient days by the pageants of St. Bartholomew's Fair. This I need hardly tell you is now swept away, as like many other once innocent pageants, it degenerated into a nuisance, the abatement of which injured none but benefited many. Other great London hospitals were also founded upon the ashes of religious houses. Of what are termed the Five Royal Hospitals, namely, Bridewell, Bethlehem, St. Thomas, Christ's Hospital, and Bartholomew, only three are devoted to the care and relief of illness and accident. As towns increased and population became denser, disease and accidents became more common. This brought out the benevolent spirit of the more wealthy of the community, and hospitals or infirmaries grew up, till now there are very few places where hospital accommodation is far to seek. There was of course a great lack of information on the part of many who built and endowed hospitals, some were placed in wrong situations, others were too large, while in many instances they were totally inadequate as to size, for the requirements of the locality.

It is not without instruction that we reflect upon the hospitals and their administration in bygone years. The records of some of them prove that instead of tending to the recovery of the sick, they became by wrong management veritable pest houses. The most notable instance of this is found in the history of the Hotel Dieu at Paris. At first it was a religious house but was afterwards adapted to serve as an hospital. The first number of beds were about 700, afterwards increased to 1,200. The law obliged the authorities to receive every patient who required help and applied for it, and in 1778 the pressure became so great as to increase the number of patients to 7,000 at one time. How this was managed it is frightful to record. The number of beds were no true index to the number of patients, instead of having beds like those now in use; the beds of the Hotel Dieu were constructed to hold four patients, and in these beds were sometimes as many as eight, ten, or twelve poor creatures packed. The bedsteads were constructed with a broad bench along the side, and on these the patients took their rest while others were in bed, and they had to take turns with each other to lie down; it is also said that the beds having solid testers over them, unfortunate patients were put on to the testers and slept there. With all this it is not to be wondered that one out of every four died, this frightful mortality induced the King in 1781 to issue peremptory orders that not more than two patients should ever be put into the same bed. Other hospitals have suffered in this way from over crowding and have become notorious for the injury they have inflicted upon the poor sufferers who instead of finding relief in the hospital only found a grave. At our own

hospital at Scutari, during the Crimean War, from overcrowding the deaths were two out of every five. Such a mortality is only comparable with the ravages of the plague when it breaks out in some of the insalubrious and uncared for localities in the East. Lest, however, you should think that all this experience has been thrown away, it is well to remind you that hospitals at the present day are pre-eminent for their perfect construction and complete organization for the fulfilment of the purpose they are founded to attain. The modern Hotel Dieu at Paris, is extended so as to lodge its patients with comfort and every appliance that is needed. In our own country we have noble hospitals everywhere; the grandest are those of Netley and the Herbert Hospital at Woolwich, these are for military patients, but St. Thomas's and other London hospitals are models of comfort and convenience for the relief of pain and sickness. Not merely in London, but throughout the whole country, England, Scotland, and Ireland, the hospitals are worthy of all commendation. The most recent form of hospital is that known as the Cottage Hospital and our own Cottage Hospital, on the verge of our noble forest, is worthy of all support, as being well adapted to its purpose in every way. In fact the best authorities on hospitals of the future, desire that all hospitals should be a series of small houses or cottages, rather than one large connected building. This is done at Ventnor.

I have spoken of hospitals as the great means for affording aid to the sick and wounded. But it frequently happens that a considerable amount of suffering takes place before a sick or wounded patient can reach the hospital. It is to this that I have specially to direct your attention this evening. We have of late years heard a great deal about this Ambulance Work. In its first significance it has of course reference to aid given in time of war to combatants. You have a picture of the kind of work as it used to be performed, in many of the most popular of our novels and poems, for you rarely read of a person suffering from a grave injury, or the hero of a novel wounded and almost dying without the ready aid of some ministering spirit being at hand. Numerous are the records of the heroism displayed in aid of the wounded or sick that are to be found on the pages of history as well as of romance.

The great organization of the knights of St. John of Jerusalem, to which the present directors of the Ambulance department look back, was in the first instance founded at Jerusalem about the middle of the eleventh century. Their object was to receive any pilgrims to the Holy Land to aid crusaders, and if need be to succour the sick, they were warmly taken up by Godfrey de Bouillon, Baldwin, and many other princes, so that they became a great power. Their dress was black with a white cross with eight points, the maltese cross on the left breast. Many and glorious deeds were associated with the order which held its own in stout warfare against the Turks. In 1291,

the Turks took Acre, and the Knights having no longer footing in the Holy Land, fled to Cyprus, and eventually fortified themselves at Rhodes, whence they were driven by the Sultan Solyman the Great in 1522. They took refuge in Italy, till in 1580 the Emperor, Charles V, gave them Malta and Gozo, hence their names, Knights of Malta. When in 1798 the French took Malta, a complete dispersion and break up of the order as a sovereign body ensued. Soon after the institution of the order at Jerusalem, it was very favourably received in England. In the year 1100 an English branch or Langue was set up. It soon acquired great power, wealth, and authority, so much so that in 1540 an act of Parliament suppressed the order and confiscated all their property. For nearly 40 years they were legally abolished. In 1577 they were restored by Royal Charter, and large portions of their property given back to them. This happiness did not last long, for in two more years the property was again seized, but the order was not suppressed, it therefore lived on continuing to send representatives to Malta to take part in the councils of the order. When the Knights were driven out of Malta, every branch or Langue maintained a separate organization. There were seven of these branches or Langues, but they very rarely met after the loss of Malta. At one of these meetings, nearly 50 years ago, it was resolved to revivify the English Langue, and to this restoration we owe the Ambulance Association of St. John. The descendants of the once haughty and Imperious Hospitallers have in a more extended manner returned to the discharge of the very duties for the performance of which the order had its origin.

It is a curious fact that the only gate now left of old London, since Temple Bar gave way to the Griffin, is St. John's gate, Clerkenwell. This is one of the gateways of the Grand Priory of Clerkenwell, founded when the Hospitallers were on the full tide of prosperity, near to the Great Carthusian Monastery of the Charter-house. In the rooms over St. John's gate, the revived order of the Hospitallers hold their meetings, and room is found in the ancient gateway for the storage of complete sets of ambulance apparatus. A committee sits every day, and every useful appliance is adopted so as to ensure the most efficient means of giving aid when required. The whole of this part of the work is carried on under the supervision of a gentleman who holds the office of Almoner of the order, everything being done in a most efficient and unobtrusive manner.

This revival of the ambulance work of the order of St. John, probably arose from the call for a better organization to carry aid to the sick and wounded that was begun during the Crimean war. It is impossible to give even a sketch of the wonderful work that was accomplished by that noble lady, Miss Nightingale, and her associates. No truer designation was ever applied to the condition of things as she found them in the Crimea. "This Sanitary

Muddle" she writes, drives me almost beyond myself. But she did what perhaps no other person could have done, and her light still burns brightly over the grim horrors of the battle field, the pestilential camps, and the fever dens of our large towns. During the last American war, between the Northern and Southern states, means the most effective and extraordinary were adopted to bring succour to the sick and wounded victims of the contest. A graphic account is given of the exertions of the National Sanitary Commission. One day they were in despair, a great battle had been fought, the very last of the money in hand had been sent to buy provisions and necessaries for the day; but where to look for provision for the next day the Committee knew not, sad and sorrowfully the last cheque was written, and the last order issued, the outlook in the morning was gloomy in the extreme. The evening brought relief in the shape of a telegram from California, authorising the Committee to draw upon the treasurer of that state as a first instalment only, for the sum of 100,000 dollars, and so the Committee went to rest with no thought for the morrow and with thankful hearts.

One more organization for the relief of sick and wounded ought to claim a short notice, I allude to the Red Cross Society of Geneva. The beneficent idea that gave birth to the proposition for a neutralization of hospitals and attendants upon the sick and wounded arose in an almost romantic manner. M. Dunant, a Swiss gentleman was at Solferino when that great battle was fought. After the contest was over he went through the battlefield. He followed the wounded to where they were conveyed in various places and did all that he could to in any way mitigate the sufferings necessarily following a battle in which 40,000 were killed or wounded. He purchased comforts and especially tobacco from all the towns, and engaged volunteer helpers in every direction. On his return home his mind was so occupied by the scenes that he had witnessed that he endeavoured to rouse public sympathy by the publication of a small volume entitled "Recollections of Solferino." In this publication he threw out suggestions for an international convention on the matter of mutual care for the sick and wounded in time of war. The Committee of Public Usefulness of Geneva took the matter into its consideration in February, 1863. In September a circular was issued to every nation that had any chance of being engaged in war. After a series of negotiations the proposition was accepted by the majority of Christian nations and by the United States of America. The Red Cross Society of Geneva was finally set on foot in December, 1864, when the formalities of the Convention were duly signed and ratified. The rules are simple, one uniform badge must be always worn and shown, such badges are only to be issued by military authorities; for the person, it is a white band worn round the arm with a red cross upon it, while on all hospitals or places where the sick or wounded are

being attended must always be shown a white flag with a red cross plainly upon it. A later regulation provides that in such cases the flag of the nation to which the hospital or tent belongs, must be also shown close to the Genevan Flag.

The first war that tested the Red Cross arrangement, was the Dan German war, this took place before the final ratification of the Convention. Volunteer assistants were sent to the camps, scholars of the Kiel Gymnasium were to be seen picking up and carrying off to places of safety, under fire, wounded men of both armies. It is to be hoped that the services of the Red Cross Society may never be required in our own country. There can, however, be no question of the interest it possesses to Englishmen, whose dearest relatives may at any moment, when on foreign service, stand in sore need of the succour of which this grand scheme was founded to provide.

You may better realize the magnitude of the cost of work carried on by means of this Ambulance arrangement, if I tell you that in the Confederate war in America, seven millions of dollars worth of comforts and succours were distributed, and I have at hand the details of what is called a "Flying Ambulance," that is an Ambulance kept ready equipped to be sent on any service where it may be required. The following is the contents and arrangements of the Flying Ambulance of the Central Committee of the Russian Red Cross Society:—It consists of six waggons packed ready for service containing 1,000 changes of linen, 3,000 bandages for dressings, 2,000 rations of preserved meats, 100 bottles of wine, a chest of tea, sack of groats, sack of salt, 200 lbs. of sugar, biscuits, cooking apparatus, pharmacy for 100 persons, tent for operations, 12 hand litters, 12 saddle bags containing a supply for anything that may be required in an emergency. The total weight is 8,400 lbs. distributed equally to the six waggons, each wagon also affording room to carry 18 wounded men if need be. Three horses are to be attached to each wagon, and where vehicles are not able to go, arrangements are made for pack horses to carry them. In giving you this detail of a Russian outfit, I am reminded that when speaking of Miss Nightingale and her work in the Crimea, I ought to have mentioned the Russian Grand Duchess Helen, who, with 300 ladies of good birth, did all as far as they could, for their fellow-countrymen in the Crimea, that Miss Nightingale did for hers, during the terrible sufferings that the campaign involved.

In order to be able to deal with a disordered or disarranged body it is necessary that there should be a general knowledge of the body in its normal or natural condition; you must not think that I can attempt to give you a complete description of the human frame in the course of this evening, but the diagrams which have been kindly lent by Mr. Preston will help me in giving you an idea of the mechanism of the body. And first, the skeleton

upon which the body is built. You see the frame so to speak is wonderfully put together, the centre of the whole is the spine, the spine is built up of a great number of bony rings of different sizes and shapes as they are required for different purposes. As in all well supported buildings the larger and more solid rings are at the base or lower end of the column, while the smaller rings are near the summit. The column you see is not straight, but it has certain curves so that shocks or blows exerting their force in the direction through the length of the column are broken and modified in going through it. The small rings form the neck and are so contrived as not only to give support to the great weight of the head, but also to allow of the free movements of the neck. These rings are designated the cervical vertebrae, the next in order are longer and stronger, they curve backwards to give roundness to the chest and support the ribs, these are the Dorsal vertebrae, below them are the last or Lumbar vertebrae, they are the largest and strongest of the bones, and form a firm support to the upper part of the column. From this centre all the rest of the skeleton depends. First the skull is placed on the top of the column, and very wonderfully joined or articulated to it; next the shoulder and arm are as it were slung on to the sides of the column, but they are supported by the ribs in a manner that will be seen when the ribs are described. The shoulder is made by two bones the scapula, a broad flat bone, with curious ridges and projections, or processes as they are called, and the clavicle, or key, or collar bone, which unites the shoulder on each side to the centre of the chest, from the shoulder you see the arm bone or humerus is slung in a way that one wonders how it is ever kept in its place, at its lower end it spreads out and has deep notches before and behind, to this end the two bones of the fore arm are united, the broad and deep notches serving to give them points of attachment; to the lower end of those two bones the wrist and hand are attached, the inner wrist bone is the ulna, and the outer bone is the Radius, the latter bone is very small at the upper end, but spreads out to support the wrist below, while the ulna is large at its upper part where it is joined to the arm bone or Humerus. The ribs are arranged so as to give great strength to the upper part where the arm is placed, as they become lower they enlarge so as to give the greatest possible space in their interior, they join together to meet at the sternum or breast bone, to the upper part of which the clavicles or collar bones from the shoulders joint. There are other ribs that help to form the lower great cavity of the body, these are called false ribs because they are not joined to the sternum, but they serve a very important purpose in giving protection to the organs in the abdomen. The lower part of the spinal column rests on the strong wedge shaped bone called the sacrum, this bone forms the key-stone of the arch of the Pelvis, the

other portion of the arch consisting of two large bones called *ossa innominate* joining in front, this arrangement is of immense strength. In each of the bones there is a deep cup-like cavity, and into this cavity the head of the thigh bone or Femur is fitted, this bone is of great strength, and like the arm bone it spreads out at its lower end to receive the head of the leg bone or tibia, to form the knee joint, in front of this joint a separate bone is placed to protect the joint from injury, this bone is the knee-cap or patella; below the knee, as in the arm, there are two bones, the tibia and the fibula. The tibia bears the whole weight of the body and transmits it to the ankle, the fibula acting merely as a support and forming the outer side of the ankle joint. The bones of the foot are arranged so as to make a very strong arch, so as to bear shocks without injury, such as take place in falling on the feet from a height or jumping.

So much for the dry bones, next in order to them are the Ligaments by which the bones are joined together; these Ligaments or tying bands are made of what is called fibrous tissue, that is they consist of living fibre, stronger far than any rope or cord that we can make, and the beautiful way in which they fulfil their office is worthy of a very careful study. They, as well as the bones are capable of repair, and so it comes to pass, that joints that have been sprained recover their use perfectly after a sufficient time has elapsed for the restoration of the lacerated ligaments. It would take a long time to describe the ligaments and mode of articulation of the various joints, but a few words will not be lost in speaking of them. Between each of the bones of *vertebræ* there is a layer of eminently elastic fibrous substance, this becomes thicker at the lower part of the vertebral column, so as to provide more of a cushion where the greater pressure takes place. The ends of the bones in the joints are covered with a layer of cartilage or gristle of a pearly colour, smooth and shining, so that we do not feel the least pain when the ends of the bones rub against each other, as they do at every movement of even the smallest joints. All these parts of the body are endowed with life, but they are stationary and have no power of motion. The varied movements and contortions of the body, whether giving expression to the features or dexterity of hand, or power in the Gymnasium, or at Football, or in the cricket field, are entirely carried out by the muscles, these are of such diversified size and shape that a description of them would require many hours continuous talking. A muscle may be shortly explained to be a bundle of contractile fibres, bound together by sheaths, and having for the most part strong bundles of fibrous tissue called Tendons by which they are attached to the various parts of the bony skeleton, which it is their duty to put in motion. The muscles differ

from the bones and ligaments in the fact that if the muscular tissue is destroyed in any way it is not reproduced again.

These different constituents of the body are all endowed with life, and in order to maintain the life of a part it must be supplied with blood and also with nervous power. This brings us to speak of the blood vessels or the channels through which the blood is conveyed to every part of the body. It is important in a matter of ambulance work that a correct idea of the mechanism of the circulation of the blood should be impressed upon every one. There are two sets of blood vessels, one carrying the blood to the heart from every part of the body, and the other set distributing the blood from the heart to the remotest recesses of the animal frame. The first set of vessels are the veins gathering up the blood after it has done its appointed work in the organs and tissues of the system. The veins begin as the smallest imaginable tubes, much finer than the finest thread of the gossamer and gradually increasing in size at last reach the heart, from thence the blood is sent through the lungs where it undergoes a wonderful change, its colour instead of being a dirty purple becomes bright scarlet, and by coming in contact with the air in the lungs it recovers its power of carrying on the varied processes of life. From the lungs the blood returns to the heart from whence it is pumped into the arteries and carried by them, it supports life, coursing through every tissue, eventually reaching the small vessels that make the border or meeting ground of the venous system. A knowledge of the course of the veins and arteries is of the last importance in dealing with wounds. The nervous system controls the whole of the functions of the body, its great centre is, as everyone knows, the brain, and the spinal cord; from these nerves are sent out in every direction, but a knowledge of the distribution of the nerves is of far less consequence than is the proper conception of the course of the arteries and veins.

To come to speak of aid to wounded or injured,—the first and most important thing is in nearly all cases to be calm, to see well what ought to be done before setting about anything. There are cases where instant and prompt help is demanded, for instance a large loss of blood must be promptly stopped, or a child on fire, or a person drowning; all these require prompt and efficient aid. But in the instance of ordinary injury much pain is often inflicted and inconvenience involved in too hasty proceedings even with the best intention. After an injury, say at football, a sudden check is given to the excitement and rush of the game, and if a hurried and confused removal of the injured man takes place his sufferings are tenfold increased beyond what they would be if he were allowed breathing time and his imagination suffered to cool. Often the idea of the injury goes far beyond the reality, and the calming of these ideas is the first and chief end to be

attained in bringing assistance. The hurried transfer of the sufferer to a hurdle and awkwardness on the part of the bearers aggravate the pain and distress to an untold amount, while the sensible aid rendered by any one who knows how to act reduces the suffering to the smallest amount.

With sprains, twists of joints, and dislocations, that is when a bone is out of its place, it is best to place the injured limb as nearly as possible in the position in which it occasions least pain, and having got it into that position, to keep it there by means of a bandage of some kind. Then the patient should be carefully lifted by as many hands as can do it with perfect ease, and placed either on a litter or carried by some strong arm. Movement as a rule gives pain therefore as little motion as possible should be given either in lifting or carrying.

In the graver accidents, involving a fracture of some of the bones, whether of the leg or arm the same rules apply, only as there is greater motion in the limb, owing to the breaking of the bone, greater care must be taken in moving, in the case of the collar bone, or of the arm, or fore-arm, the fore-arm of the injured side should be placed in a sling and the arm fixed by another bandage to the side, so as to avoid motion when the patient is lifted or carried.

When the thigh bone or leg are broken it is best to have the leg extended, and if a piece of board, or an umbrella, or cricket stump, or two walking sticks are at hand it should be tied perfectly straight on to the outside of the injured leg by two or three bandages or pocket handkerchiefs, then the two legs should be tied together, before attempting to lift or carry the patient.

So far these injuries involve no risk to life or limb, although they do occasionally involve a great deal of worry and pain.

Wounds and contusions belong to another group. Contusions are only dangerous when they are inflicted on vital parts; a contusion on the stomach or over an important organ is apt to be followed by grave consequences, and a contusion on the head is frequently followed by distressing symptoms, if not by death. Two instances of death from a blow of a cricket ball have happened, and a poor fellow was killed at football by a blow on the stomach, and a member of our own Football XV nearly lost his life by a violent blow just over his heart.

Wounds vary in degree as well as in gravity in proportion to their extent, their situation, and the instruments or means by which they are occasioned. The most difficult wounds to have to do with are those called penetrating, that is without a large external or visible wound, the injury extends for a considerable depth below the surface. Such wounds are caused by stabs with a sharp instrument, or by balls from guns and pistols. The wound of

the President of the United States is a sad instance of a penetrating wound. As a rule bleeding follows any kind of wound. Now there are varieties of bleeding just as there are varieties of wounds, but all bleeding must be of three kinds, either the blood must come from arteries or from veins or from the very minute vessels that are diffused in every part of the body. If an artery has been wounded the blood spurts out not in one continuous stream, but it comes in jets with intervals corresponding to the beat of the heart; the blood is also of a bright scarlet hue. When there is a wound of a vein the blood is of a darker colour, but it flows quietly without spurtng. The blood, when neither arteries nor veins are wounded, oozes rather than flows, yet with oozing a great deal of blood may be lost unless means are adopted for arresting the flow.

You will remember that I said that the arteries carried the blood from the heart and the veins carried it from the extremities to the heart. You will see that upon this fact depends the means used to stop the bleeding. If there is clearly a wound of an artery the pressure must be placed between the heart and the bleeding spot, but if a vein is wounded then the pressure should be applied below the wound. As arteries and veins run in perfectly well known directions it is easy to apply pressure just where it is required. If the bleeding goes on pressure must be made directly on the wound and a tight bandage applied with sufficient force to control the bleeding. The edges of the wound should be carefully brought together and cold wet bandages applied. Before bringing the edges together it is best to take care that no foreign matter such as gravel or stones or pieces of clothing are left in the wound. The limb, if the wound is on one of the extremities, should be carefully supported in a sling or with bandages. The great point in attending to wounds is to stop bleeding, if it is profuse.

There are other accidents that require notice besides sprains, fractures, contusions, and wounds. Fainting, concussions, sunstroke, are all apt to occur from a variety of causes

Fainting is usually caused by anything that interrupts the regular action of the heart or brain, there is a loss of sensation to external things, and an entire absence of the power of motion. Everyone knows that it is only necessary to lay the fainting person on his back, to dash a little cold water on his face and to let him smell some strong stimulant like ammonia, and the restoration of the heart's action follows, and in a short time recovery is complete. Concussion is much more varied in the amount of its gravity than fainting, it may be only a simple stunning or it may be so severe as to involve even risk to life. When any one is stunned they should be laid down and nothing said to them. It is best to shut out the external world completely and to cover the face with a handkerchief. A person slightly

stunned instinctively puts his hands to his face to cover his eyes so as to keep all impressions from his already confused brain. It is not well to be in a hurry to move a patient suffering from concussion to any distance, letting them rest till the first shock is abated is much better.

In the case of sunstroke, cold should be applied to the head and to the body generally, as the evil is caused by an increase of the heat of the blood, and unless the extra heat is rapidly removed, death inevitably takes place. Sunstroke is not exclusively due to the sun's rays, but persons working in places where there is a constant high temperature, suffer in a similar manner if they continue too long at work without going out to cool themselves. In New York and other American cities where sunstroke is frequent owing to drink and exposure to great heat, the patient is laid over a trough containing blocks of ice, an attendant plays with a nozzle charged with iced water all over the body, with most satisfactory results.

In cases of apparent drowning, life may often be restored after a very long immersion in the water. The principal thing is to restore the breathing but before doing this the body should be laid upon the back, the shoulders supported, and the head hanging down a little; the tongue should be pulled forward to prevent its blocking up the entrance to the windpipe, and then regular action should be taken to alternately compress and enlarge the cavity of the chest, this is done by Sylvester's method, or Marshall Hall's method or by what is called the direct method of Dr. Howard. The detail necessary for the proper understanding and application of these methods must be given when classes are formed for instruction in Ambulance work. If such classes come into existence the greatest assistance will be found in using the manuals and following the programme of the St. John's Ambulance Association.

CASUAL GLANCES AT THE MOON,*

READ BY R. W. MERRIMAN, ESQ., DEC. 1st, 1881.

Of all the heavenly bodies the Moon, our old acquaintance, near neighbour, and faithful attendant, invites the earliest attention. At the Sun our glances, if taken at all, with unprotected vision, must of necessity be very casual indeed, and his apparent steadfastness of station and uniformity of brilliancy do not, to the general observer, hold out much promise of profitable examination. It is otherwise with the moon, her mild radiance, even at its highest splendour does not distress the eye and her rapid changes of position and of form irresistibly court enquiry. With so punctual and persistent a repetition, indeed, do these changes run their course, that, almost insensibly, we acquire a general acquaintance with the laws upon which they are conducted.

Strange forgetfulness of these laws does occasionally manifest itself. The cover of an interesting book of travel published last year, bears a design in which it represented the mountainous horizon of a wild region. At some distance above the horizon are seen the seven stars of the Great Bear, and immediately beneath the three tail stars of that constellation the Moon is discernible. From her position and figure it is apparent that she has just risen and that she is in her last quarter. But a bright star of five points is made to be shining exactly in the position in which its rays would have to penetrate the central mass of the Moon, in which, in fact, the star would be in hopeless and irretrievable occultation. The sketched too does well to be cautious lest in throwing a conventional moon into an evening sky he portray exactly the form which can only be witnessed in early morning.

Let us briefly recall some of the familiar and recurrent lunar phenomena. The change of Moon from Old to New takes place as we know at a moment when our satellite, being (relatively to our own globe) in a position near to the Sun, presents to us its dark hemisphere, and is invisible both by day and night. About two days after this time, a luminous sickle displays itself low down in the evening sky, and hurries beneath the western horizon, after the Sun already set. This thin slice of light, however, is not all that catches the eye. Faintly but unmistakably illuminated, we perceive a shadowy disk which fits unto the concavity of the sickle, filling it out to a complete circle. We know that this is the dark surface of the Moon, lit up by the reflection of the sun's rays from our own earth. Time out of

* This paper lays no claim to originality: it pretends to nothing which may not be found in elementary text books or familiar treatises. Proctor, Nasmyth, Lardner, and other writers have been unscrupulously requisitioned, not only for matter, phraseology, and illustration; but also for copious extracts acknowledged here by inverted commas.

mind this appearance has been styled the new moon holding the old in her arms, and it is attended by the striking peculiarity that the horns of the new moon seem not only to surround, but to overlap, the disk which they are holding. It is well known that this is an effect of irradiation by which the bright surface is optically expanded beyond its real dimensions while the dark disk exhibits only its true magnitude. This effect of irradiation has been especially misleading in the measurement of the moon's diameter, with a result that measurements of the dark moon have given her a diameter seven miles less than that which had been assigned to her bright surface.

—But to resume our observations—Evening by evening the slender crescent waxes more substantial, its distance from the sun increases, its setting takes place at a later hour, until between the seventh and eighth days from new moon, it has assumed the shape of a semicircle. During that week it has become very apparent that the convexity, or limb as it is called, of the moon presents a clean cut edge towards the sun, while the concave line, or terminator, is rough and uneven. At this stage of her growth too she somewhat surprises us by what seems an almost unseasonable and premature entrance on the afternoon sky, so that by the time the deepening shadows of evening allow her radiance to assert itself, she is already far advanced on her march towards the western horizon. About the fifteenth day the orb of the full moon rises, round and ruddy, just as the sun is setting, and passing the meridian at midnight, sets as the sun is rising. But the mature splendour thus gradually attained has no permanency. Night by night the illuminated disk decreases in size and assumes again the semi-circular form, this time with the limb towards the east and the terminator towards the west. Now too this half-circle lingers far into the day, and may be seen above the western horizon at ten or eleven o'clock in the morning, at a time of day when we instinctively feel that any moon of regular habits ought long ago to have retired to rest. A conviction seizes us that such hours as these must be the ruin of any constitution, and our sage misgivings do not lack a seeming fulfilment. The figure of our friend shrinks once more to a slender crescent, between whose now westward pointing cusps, the shadowy circle of the almost darkened hemisphere again declares itself, by feebly returning the rays which it receives from our own broad sunlit surface. The hour of rising now precedes that of the sun by so short a time that the last attenuated arc of the waning moon, (witnessed only by those whose occupation or fancy keeps them astir at early hours), soon fades before the effulgence of the dawning day. Soon too, even this dwindling curve ceases to be discernible, and in about twenty-nine days and a half the position of comparative proximity to the sun is regained: the moment of new moon recurs, and our faithful satellite proceeds to repeat once more the sequence of phases which she has just completed.

But during the growth, maturity and decline of the moon's splendour it has been impossible not to perceive that the disk turned towards us has a variegated or mottled surface. Fancy has found in these dusky markings a resemblance to the human countenance. A band of brightness following the chain of mountains called the Appennines does duty for the nose, the right eye is formed by the Sea of Showers, the left by the Sea of Serenity and the Sea of Tranquillity, while the Sea of Clouds takes the place of the mouth. The oblique eyebrows and round open mouth which these lunar features serve roughly to reproduce, impart an expression of pain and distress to a face which a French superstition teaches to be that of Judas Iscariot thither transported for his treason. But though each succeeding day diversifies the measure of illumination which these features receive, yet the features themselves never change. It is always the same sad countenance which sorrowfully regards us; the profile of this portrait is for other eyes than ours; so far as we are concerned the man in the moon never turns his head.

From the phenomena which we have been noting it is abundantly apparent:

(1) That the orbit of the moon from the sun to the sun again occupies about twenty-nine and-a-half days; and (2) That one of her hemispheres and one only is visible from the earth, and it follows that a single turn on her own axis is performed by the moon in a period agreeing exactly with that of her orbit. The correspondence between these motions will be readily recognised by their reproduction on a smaller scale. Let us imagine a pedestrian plodding for a wager, round a small circular lap, having his left side towards an observer (the Referee for instance) whom we will place in the centre of the enclosure, while we ourselves occupy a position exterior to, and at a short distance from it. The Referee then, so long as he retains his central station will not catch sight of the pedestrian's right side at all, the left side will be continuously presented to him at every point of the course. From our external post of observation however our view will be quite different. As the performer passes near us, his right side will be that which we shall see, soon he gradually turns his back upon us, then as he speeds along the top of the course his left side comes into view and, as he completes the circuit, his full face, and again his right side, become successively visible. It is clear that his body has revolved once, as surely as if he had been standing beside us, and we had been turning him gently round with our own hands.

It cannot, however, be stated with strict accuracy that one lunar hemisphere, and one only passes before us. For the case of the moon differs from that of the runner in this particular. The turning of his body always agrees exactly with his progress round the course. With the moon it is not so, her rotation on her own axis is performed at a uniform velocity, but the pace of her orbital revolution round the earth is subject to variation. Hence

a want of coincidence between the two movements, with the result that sometimes we see as it were a little further round the left side of the moon's face, at other times a little further round the right side. Again, the plane of the moon's orbit round the earth, lies at an angle to the orbit of the earth round the sun with the consequence that some slight portion of the regions adjacent to the moon's North and South Poles are by turns, disclosed to our eyesight, and withdrawn from it. The former variation of visibility has the name of the libration in longitude, the latter, that of libration in latitude. The effect of both is that if the whole surface of the moon be computed as of one thousand parts, five hundred and sixty-nine of these are visible, the four hundred and thirty-one remaining parts being for ever beyond our ken.

We have seen that the moon completes her circuit from the sun to the sun again in about twenty-nine and-a-half days, but she circles round the earth in something like two days less than that time. The difference between the two periods has an obvious explanation. It is the difference between the sidereal and solar day. If the earth continued to occupy an immovable station in reference to the sun, then as the moon completed, in twenty-seven days and eight hours, her orbit round the earth, so would she at the same moment return to her starting point near the sun. But in fact the earth has been employing the twenty-eight days after a very different fashion, and has during their currency been speeding along, and accomplishing a thirteenth part of her own journey round the sun, so that by the time the moon returns on the twenty-eighth day to the same point, in relation to the earth, from which she started on the first, she finds the whole situation so changed that there remain two more days' work before her ere she can regain her point of proximity to the sun. This rapid flight of the earth through space does in fact regulate the line of the path actually pursued by the moon, as it would be witnessed by an observer placed at a distance from both. If the earth had been stationary the moon would have continued to describe neat circles or ovals round it, each of which would have followed for the most part the line of its predecessors. But it is clear that nothing like this takes place, for the moon, dragged along in her involuntary subservience to her primary, the earth, is never allowed leisure to carry out her intention of describing a circle, nor indeed to make even the most distant approach to that figure. We have likened her orbit to the circular path of the runner, and we have placed our globe in the position of the Referee in the centre of this path, but to keep up the comparison we should have to start the Referee himself on a very long course indeed, which he would have to compass at a frightful pace, with the consequence that the poor pedestrian would be drawn far away from his circular path, and that in his endeavours to maintain the same relative position towards the central object, his real journey would become a slightly sinuous line instead of a series of rings.

"If a perfectly exact representation of the moon's path were made in very fine wire on a tolerably large scale, it would require the nicest scrutiny to distinguish the wire curve from a perfect circle. Again, if we represented the earth's path by a circle a foot in diameter made of wire one-thirtieth of an inch in thickness the moon's path would be wholly included within the substance of that wire passing alternately close to its inner side and its outer side, at points dividing the ring nearly into twenty-five equal parts."

The accompanying diagrams are intended to illustrate this.—Let us suppose the earth's orbital velocity to be far less than it is and we shall easily picture to ourselves the chain of loops which the moon might then describe. Such a chain of loops was at one time supposed accurately to represent her real path. The waving line here shewn (which however I must beg you to understand is a gross exaggeration and parody of the moon's own waving line) will serve to explain how her course is distorted from the circular to the serpentine figure.

The beginning and end of this race has, as we have seen, been the point at which the moon hangs immediately in a line between the earth and the sun, and if the moon's orbit lay in the same plane as that of the earth round the sun, it would follow that at every new moon we should have an eclipse of the sun and at every full moon an eclipse of the moon; indeed the glory of the really full moon would be lost to us. But these two orbits lie, as we have already seen at an angle to each other, and this angle is nearly constant. The moon therefore passes across the ecliptic twice in every lunation, and it is only when these points of crossing, called the nodes, align themselves with the sun and the earth, that a solar or lunar eclipse, as the case may be, is occasioned, and so accurately are these points ascertained that a pennyworth of Almanac gives us the desired information for any twelve months.

The apparently circular but really serpentine journey of the moon is not maintained at one invariable distance from the earth, it takes the shape of an oval rather than of a circle, the earth occupying one of the foci of the ellipse. The greatest distance between the centres of the two bodies is nearly 65 semi-diameters of our globe, the least distance nearly 58 semi-diameters; the mean distance being a little over 60 of these measures. Now if the distance of the centre of the moon from the centre of the earth be, in round numbers, 240,000 miles and the equatorial diameter of our earth be about 8000 miles it follows that 30 globes such as ours piled one on another would reach to the moon. If we could unbuckle the girdle of the equator, shake it out to its full extent, and run out nine times its length on an imaginary tape, that measure would nearly suffice for the distance. If we could start the Flying Dutchman on an uninterrupted journey, at a

speed of 60 miles an hour, the passengers would be enabled in about half a year's travelling to alight at a lunar Railway Station, whose title, it is to be hoped, would, on their arrival, be proclaimed in accents more intelligible than those which greet our ears from earthly platforms. But perhaps even a more striking proof of the comparative nearness of our satellite, is one which at the same time corrects the mental illusion under which the moon at its rising appears to have a greater magnitude than that which she assumes when hanging in the mid-vault of heaven. A like illusion affects the sun also, and the following is an explanation of it from the pen of a high scientific authority.

"The explanation of this singular effect, in which all astronomers appear to concur, refers it to mental and not optical causes; strictly speaking it is not an optical illusion. The error is one of the mind and not one of the senses. The estimate which we form of the actual magnitude of any visible object depends on a comparison of the apparent magnitude which that object presents to the eye with the distance at which we imagine it to be. Thus if there be two objects, buildings for example, which have to the eye the same apparent height, but which we know or believe to be at different distances from us, we instinctively and without any operation of the judgment, of which we are conscious, conceive that which is more distant to be the largest. To apply this reasoning to the sun or moon we have to consider that when either of these objects is in the horizon a portion at least of the space between it and the eye is occupied by a series of objects with the magnitudes and relative positions of which we are familiar, we are therefore enabled to make some estimate of a portion of the space that intervenes between the eye and the object. But when the object is in a more elevated position in the firmament, no part of the intervening distance is thus spaced out, and we are accustomed to consider the object nearer to the eye. Conceding this, then it will be asked how it explains the universal impression of the enormously large disk of the sun or moon when rising or setting; the answer is, that when in or near the horizon the mind is impressed with the idea that the distance of these objects is much greater than when on the meridian and that their apparent magnitude being the same, the real magnitude is judged to be greater in the same proportion as the distance is supposed to be greater. Thus if we are impressed with the notion that the sun seen in the horizon is twice as distant as the sun seen in the meridian, we shall infer its diameter to be twice as great since it appears the same, and if its diameter is twice as great, its apparent superficial magnitude will be four times as great."

Such is the explanation which the astronomers offer us, and in which we are told they all concur. It would be flat heresy to question the efficacy of a theory promulgated under such authority, but whether it carries immediate

conviction to the understanding of those who are the habitual victims of the mental illusion which it proposes to solve, is not so absolutely certain.

Whatever may be the case with the sun, whose immense distance from the earth reduces to insignificance any approach towards him which is made by any given portion of the globe, in virtue of its diurnal rotation, this rotation has a very appreciable effect in our relations to the moon.

Scientifically measured, the disk of the moon at midnight exceeds in apparent diameter that of the same disk when seen on the horizon. And if it be remembered that this change of position on the part of the moon indicates a quarter of a turn by the earth on its own axis, we shall recognise that by this process any individual observer has by midnight materially reduced the distance which at sunset lay between him and the moon.

The diameter of the earth may be taken to measure in round numbers 8000 miles. By midnight therefore a person stationed near the equator has been carried forward half that distance towards any celestial object which at 6 o'clock in the evening he saw on the eastern horizon. In the case under consideration this semi-diameter forms no less than one sixtieth part of the whole distance. Such a proportion appears perhaps insignificant when applied to small measures of length. At an Archery meeting for instance the most sensitive of bowmen would not be disconcerted if by any misadventure the 60 yards distance had been set out three feet short. At a rifle range it would not be perceptibly easier to score a bull's-eye at 590 yards than at 600. As we magnify distances, however, the proportion rises in importance. A 30-yards lead towards the close of a mile walking race would not be a contemptible advantage. A boat's length suffices on the course between Putney and Mortlake to make all the difference between victory and defeat while on many of our great race courses a fortune may change hands on a question of hardly more than a few inches.

The considerable changes thus brought about in the course of six hours, in the relative position of an observer and the moon have been most ingeniously turned to account in the production of stereoscopic views of the latter, exhibiting for instance the full moon as a globe and not as a flat shield.

It is no part of my purpose to venture on a mangled explanation of the Binocular Parallax, but we are all aware that the relief or prominence which characterizes objects seen through the stereoscope, the natural manner, that is, in which any object near at hand stands forward and distinguishes itself from the objects behind it, is obtained by an imitation of human vision, by the simultaneous exhibition of separate views of the same scene, those in fact taken respectively by the right and left eyes. and by such an arrangement of these, that, seen together, they form but a single picture, with all the delicate gradations of distance which in the actual scene itself assert themselves by virtue of being

looked at by two eyes at once. Now the different views which as we have already described we do actually obtain of the moon's illuminated surface have enabled skilful photographers to take pictures containing just sufficient dissimilarity to produce the stereoscopic effect, and stereoscopic slides so prepared, afford illustrations of lunar objects on a small scale in a very striking and realistic manner.

But it is to the telescope that we are mainly indebted for the now considerable sum of knowledge which we possess concerning the moon's physical elements and external appearance. Even a pair of Binocular Field Glasses steadily lodged on a substantial rest, brings within range a good deal of the lunar topography, while with a telescope of moderate power much accurate observation may be taken. Such an instrument instantaneously dispels the impression of superficial smoothness or flatness which the naked eye receives. The lunar surface is at once perceived to be stamped and pitted all over (save in certain tracts comparatively undisturbed) with rings and cavities, the contents of which appear to have been industriously piled up round their outer edges.

These cavities and ridges are of infinite variety in size, shape, and disposition. To a person acquainted with the circular and oval earthworks on the Wiltshire Downs the suggestion is irresistible that some extinct races of lunar aborigines must have been very hard at work indeed in studding the whole available area of their planet with circular intrenchments, in the centre of which in many instances they appear to have raised one or more conical mounds: very large Barbary Castles, with very large Silbury Hills in the middle of them. It is interesting to know that Kepler himself entertained some such notions, which of course have long since made way for the generally accepted explanation that these rings have their origin in volcanic action.

The diagrams borrowed entirely from Mr. Nasmyth's valuable monograph are an attempt to portray in perspective a normal lunar crater, and to illustrate in section the operation by which such craters probably came into being. Mr. Nasmyth explains in detail the conditions under which the crust of the moon's surface "starred" by the solidification of sub-surface matter gave way at last and allowed the forcible ejection of the lunar equivalent of lava. Propelled to an immense height above the surface (and we shall have to recur to the question of lunar gravitation) the ejected matter would fall in wide sweeping circles, and such a hail of stone and ashes continuously maintained during a lapse of time, the duration of which we have no means of estimating, may well have sufficed to raise circular mountain chains of stupendous dimensions. So fierce a bombardment maintained indefinitely and without intermission could not fail to wear out what we may call the mouth of its cannon; the central point, at which the topmost crust of the moon at last yielded to the eruptive energy from below, must soon have

become widened, until a large amphitheatre was at last scooped out; the excavated strata serving to contribute to the upraising of the huge parapets of igneous rock of which we have been speaking. But as the terrible cannonade at last wore itself, out the missiles would fall of their original range; falling further and further within the parapet they would roll down its interior slopes and serve to fill up again the amphitheatre, from the middle of which they had been expelled. At last too the limit of projection would become so reduced, that the powerful dispersion of early days would shrink to a very modest fountain, which in time would subside altogether, having managed to raise for itself such a monumental cone as is to be found in the centre of a majority of those circular mountain chains.

But these central cones are by no means invariable features in the lunar craters, indeed it would seem as if every possible diversity of form, within certain typical limits, had been exhibited. Some of the craters are conical abysses, of which the lowest depths (especially at the poles) are probably never reached by the solar rays. While on the other hand some of the polar peaks are so placed that their summits are never withdrawn from sunshine. In other instances the cavities if originally existing have since become filled up, and instead of an excavation or an eminence we find a comparatively smooth and even floor. The magnificent and interesting crater named Plato is an example of the last mentioned type. Within mountain fortifications ranging to heights varying from 4000 to 8000 feet it encloses a level enceinte seventy miles in diameter, known as among the darkest spots of the moon's surface. Copernicus, on the other hand, with a diameter of forty-six miles, has a central cone 2400 feet high. In the remarkable trio of Theophilus, Cyrillus, and Catharina are found examples of both types. Catharina, with a diameter of 65 miles has no cone, but the mountain chains which enclose the vast plain reach an altitude of 18,000 feet. Of Cyrillus the diameter is 60 miles; of Theophilus, 64; their central cones being 5,800 and 5,200 in height. Tycho, a magnificent circular crater, which occupies in southern latitudes a brilliant region easily discernible by the naked eye, has a diameter of 54 miles, and a depth of 16,400 feet from the ridge of the rampart to the surface of the plateau which it surrounds, whence rises a grand central cone 5,000 feet high. This region is one which affords some compensation for the otherwise rather flat and uninteresting elevation which the moon, when at the full, opposes to the telescope; while in other regions the full moon seems to repay telescopic observation with little but a blinding glare, the country round Tycho abounds in brilliant radiating streaks, which, taking him for a centre hold their way for miles upon miles in divergent directions.

The valley in the Alps is about 75 miles long and six miles wide in the broadest part. These mountains attain an elevation of 10,000 feet. More

important is the chain of the Appennines, ranging in length from end to end 450 miles, with peaks reaching an altitude from 18,000 to 20,000 feet.

All appearances tend to shew that volcanic action, potent or feeble, exerted itself again and again at the same spot at different intervals of time; small craters are found inside larger ones, nay sometimes on the very ramparts themselves, and the flat plains of which we have spoken were no doubt in many instances formed by the exudation and subsequent cooling of lava within the basin of the mountains; in one unique instance this welling up of lava has filled the basin to the very brim, leaving at a lofty elevation a vast table-land, the descent from which on any side can only be made by the precipitous crags which serve to compose its pedestal.

Curvilinear figures seem to have had a special charm for the moon, they recur again and again, and almost every feature of the surface seems to have conformed to the prevailing fashion. The craters large and small partake of it. Considerable areas, the boundaries of which cannot confidently be ascribed to such agencies as those which we have already been illustrating, are circular in form and this universal model regulates even the shores of the large open tracts which in the first days of telescopic observation received the misnomer of seas. Later investigations banished alike the idea of seas or of an atmosphere (such as we know) for the moon. But when the early observers turned their glasses of limited power upon the lunar surface they perceived not only the elevations and depressions, the mountains and valleys of the moon, but they became aware that between and around these there were placed immense level spaces of darker colour than the adjacent continents, and apparently of smooth surface. What wonder then that they formed the opinion that these must be lunar oceans, and such they accordingly pronounced them. Nor were they sparing of euphemistic appellations; The Sea of Serenity, the Sea of Tranquillity, the Sea of Fecundity, the Sea of Nectar, the Bay of Rainbows, are titles whose agreeable suggestions outweigh any unpleasant associations which might be conjured up by those of the Sea of Clouds and the Ocean of Storms. An equally attractive vocabulary is that of the names by which the craters and mountain chains are dignified. Of the latter we find the Alps, the Appennines, and the Caucasus; while the former, a numerous host, borrow their titles each from some distinguished leader in the domain of philosophy or letters.

But the notion of seas gave way before higher magnifying powers and more exact observations. The smooth areas proved after all to be only smooth by comparison. Their surfaces were found to be rent and wrought in like manner, only in minor measure, as were those of the so-called the continents. And it may be that dots now scarcely perceptible, with which these areas are studded, may under yet higher powers be found to reproduce on a smaller scale all the familiar features of the larger craters.

The existence too of large expanses of water would pre-suppose the existence of an atmosphere such as might arrest evaporation and might restore to the surface in the form of rain, the moisture driven from it by the action of heat, rescued in its flight by atmosphere, and there collected into clouds. There are many occasions on which an atmosphere such as we possess could not fail to declare itself if any surrounded our satellite. When during an eclipse of the sun the black disk of the moon begins to invade the blazing orb, the presence round the former of any coating of air would produce a refraction of the sun's rays, which could not escape detection. A similar effect would ensue upon the occultation of any star by the passage across it of the dark limb of the moon. No such refraction has been observed. Again the perfect clearness with which the terminator or frontier between light and darkness is visible, is inconsistent with the existence of an appreciable atmosphere. If any such atmosphere were present, it could hardly fail that the border land between light and darkness would be obscured by clouds. For the passage from light to darkness on the moon is equivalent to a passage from glowing heat to an icy cold of which we can have no conception. Such a change would infallibly produce all the evidence of atmospheric disturbance, which could not but ensue upon the rapid transition from a condition of evaporation and expansion to one of extreme condensation. For the days and nights of the moon are serious units of time; each lasting over a fortnight. For nearly fifteen days do the untempered rays of the sun pour down upon hill and plain with a fierce heat exceeding a hundred-fold the extreme temperature of our own torrid zone, for a like interval is there unbroken night in which the accumulated heat is rapidly dispersed by radiation, to be succeeded by an Arctic rigour compared with which the climate of our own North Pole would be genial. But no such atmospheric disturbance has ever been witnessed, and the presumption is overpowering that the moon lacks altogether an atmosphere bearing any analogy to our own.

If that be so, if the wild country which we have been describing alternately scorched with heat, and reduced to indescribable cold, does indeed support any living inhabitants, they must be fashioned on a model with which we are wholly unacquainted. The belief then is very general that the moon is uninhabited, but we naturally ask what is the extent to which telescopic investigation can be relied on to determine the question.

First let us take note that systematic observation with the telescope demands unlimited patience and perseverance, Mr. Proctor writes:—"None but those who have tried the experiment can believe how seldom the astronomer has a really dark clear night with the atmosphere in good condition for observing. I have myself had occasion to note this circumstance somewhat markedly, for I have desired to gauge the star depths with a very

fine reflecting telescope kindly placed at my disposal. But when I set aside those nights when twilight continues all the night, those when the moon shines, cloudy or hazy nights, and nights when the air is disturbed and unfit for telescopic work, I find the time really available for this special work amounts only to a few hours in each year."

But the question remains, what is the extent of the magnifying power which can be brought to bear on the moon. We cannot do better than cite the opinion of Mr. Nasmyth, whose designs we have so unscrupulously pirated. He says:—"We have alluded somewhat indefinitely to high powers, and an enquiring but unastronomical reader may reasonably demand some information upon this point. It might have been instructive to have cited the various details that may be said to come into view with progressive increases of magnification. But this would be an all but impossible task on account of the varying conditions under which all astronomical observations must necessarily be made. When we come to delicate tests there are no standards of telescopic power and definition. Assuming the instrument to be of good size and high optical character, there is yet a powerful infant of astronomical definition in the atmosphere and its variable state. Upon two-thirds of the clear nights of the year the finest telescopes cannot be used to their full advantage because the minute flutterings resulting from the passage of the rays of light through moving strata of air of different densities are magnified just as the image in the telescope is magnified, and only the grosser features are left visible. And supposing the telescope and atmosphere in good state, there is still an important point, the state of the observer's eye, to be considered. After all it is the eye that sees, and the best telescopic assistance to an untrained eye is of small avail. The eye is as susceptible of education and development as any other organ. To a tutored eye a great deal is visible with a comparatively low power, and practised observers strive to use magnifying powers as low as possible so as to diminish, as far as may be, the evils arising from an untranquil atmosphere. With a power so small as 30 or 40 many exceedingly delicate details on the moon are visible to an eye that is familiar with them under higher powers. With 200 we may say that every ordinary detail will come out under favourable conditions, but when minute points of structure, mere nooks and corners as it were, are to be scrutinized, 300 may be used with advantage. Another hundred diameters almost passes the practical limit, unless the air be not merely fine, but superfine, the details become "cloudy" and tremulous; the extra points brought out by the increased power are then only caught by momentary glimpses, of which but very few are obtained during a lengthy period of persistent scrutiny. We may set down 250 as the most useful and 350 the most effective power that can be employed upon the particular work of which we are treating. Could every detail on

the moon be thoroughly and reliably represented as this amount of magnification shows it, the result would leave little to be wished for. But it may be asked by some, what is the absolute effect of such powers as those we have spoken of in bringing the moon apparently nearer to our eyes? And what is the actual size of the smallest object visible under the most favourable circumstances?

"Perhaps the smallest angle that the eye can, without assistance, appreciate, is half a minute, and since there are 60 seconds in a minute, it follows that we must magnify a spot a second in diameter upon the moon thirty times before we can see it, and since a second represents rather more than a mile, really about 2000 yards, on the moon, as seen from the earth the smallest object visible with a power of 30 will be this number of yards in diameter or breadth. To see an object 200 yards across we should require to magnify it 300 times, and this would only bring it into view as a point; 20 yards would require a power of 3000, and one yard 60,000 to effect the same thing. Since, as we have said, the highest practicable power with our present telescopes, and at ordinary terrestrial elevations, is 350 or, for an extreme, say 400, it is evident that the minutest lunar object or detail of which we can perceive as a point must measure about 150 yards, to see the form of an object so as to discriminate whether it be round or square it would require to be probably twice this size. Arago put this question into another shape. The moon is distant from us 237,000 miles (mean). A magnifying power of 1000 would shew us the moon as if she were distant 237 miles from the naked eye.

2000 would bring her within 118 miles

4000 " " 59 "

6000 " " 39 "

Mont Blanc is visible to the naked eye from Lyons at the distance of about 100 miles; so that to see the mountains of the moon as Mount Blanc is seen from Lyons would require the impracticable power of 2500."

We have said, as yet, but little about the dimensions of the moon. The diameter may be stated to be 2153 miles, which means of course the diameter of the disk which constantly faces us. What may be the moon's diameter on a line drawn from the centre of our globe through the centre of hers is another question which depends on the form which the total mass assumes. There seems reason to believe that the form cannot be that of a sphere, it can hardly be doubted that the constancy with which the moon turns towards us ever the same hemisphere, originates in a preponderance of matter in our half of the moon. Our half, if the expression may be allowed, is heavily handicapped as compared with the other. Nor can it be lightly questioned that our globe is responsible for this disparity of contents. The powerful attraction which the earth exercises upon the moon must, at a time

when the latter was yet in a plastic condition, have warped and drawn the slowly solidifying mass and probably thus moulded into somewhat the shape of an egg, the cooling matter, which, but for such interference, would have been content to roll itself over and over into a billiard ball. The lunar surface which we look down upon is probably that of an elevated dome rather than of a true hemisphere.

If such be the case, if the quantity of the moon's mass, which we regard, be drawn out of the spherical form, the presumption is strong that some compensating modification has overtaken the half of the moon which is withdrawn from our vision, but the difficulty of estimating the measurement of the diameter which we are considering will be apparent when we remember that as to the form which the other side of the moon may have assumed we possess no certain knowledge.

Concerning this invisible side of the moon much imaginative conjecture has been hazarded. If some speculators have peopled it with inhabitants, others (no doubt with equal reason) have transferred to it the seas and oceans which are denied to our side. Others again have gone the length of asserting that if we could peep over the shoulders of our side we should discover nothing but an immense depression, a vast cavity, in fact that the moon, as we see it, is but a hollow cone. These wild imaginations rest on no proof and do not invite serious discussion. There seems little room to doubt that the unseen regions of the moon resemble in the main the portion which we are able so minutely to examine.

It would be a natural consequence that an attractive force capable of distorting the lunar sphere would persistently retain its hold on the undue share of matter which it had gathered within its grasp. If the moon had been able to assume the spherical form it might have spun round on its axis at a higher velocity than that which it at present achieves but so soon as it became a settled matter that the dome which our earth had been instrumental in modelling was to remain always pointing towards us, so soon did it follow as a matter of necessity that the moon's axial rotation and her orbital revolution should be completed in precisely the same period.

But to return to the moon's dimensions, the area of the visible hemisphere is 7,328,500 square miles so that the area of the whole moon is estimated to be 14,657,000 square miles, the density is a little more than three times that of water while the force of gravitation at the surface equals only about one-sixth of that exercised by our globe on its own occupants and terrestrial features. This low power of attraction admits therefore of displacement from the moon's surface to an extent unknown upon earth. If five feet be an easy high jump among mundane mortals the lunar athlete would clear his thirty feet with equal unconcern. The range of lunar artillery would be something frightful to think of, the more so as the flight of their projectiles would be

unimpeded by any friction with palpable atmosphere. These conditions have immense significance when we have to consider the traces of eruptive energy which the moon's surface everywhere exhibits.

Nor is the moon of altogether despicable size compared with some of her neighbours. The following may be taken as comparative values of Magnitude and Mass :—

	Magnitude.	Mass.
Earth.....	1,000	1,000
Venus.....	855	885
Mars	168	118
Mercury	58	65
Moon	20	12

Thus it will be seen that although the moon be markedly inferior to the other four planets, yet Mercury does not exceed her either in magnitude or mass in a degree equal to that by which the Earth or even Venus exceed Mercury.

Passing by the speculations as to the causes which gave the moon her own individuality and launched her on a separate but subordinate career—whether for instance she be indeed bone of our bone, and flesh of our flesh ; a rib, not silently drawn from us in slumber, but forcibly dashed out of our side by the impact of some erratic body in times when as yet our existence was one of chaotic nebulousity—leaving these conjectures for the present we may yet turn our attention to some of the friendly functions which the moon has for ages been discharging on our behalf. Her benefits to us as a nocturnal luminary are so intermittent as to lose a good deal of their value, nevertheless they are not to be disregarded. In times of more primitive locomotion than those of the present day the occurrence of full moon was selected as the season for friendly gatherings, club assemblies, or public meetings ; and to this day may there be found Urban Authorities who putting their trust in almanacs regulate their public lighting by the lunar phases, and give the lamp-lighter a few days holiday (any density of clouds notwithstanding) when the parish lantern is or ought to be on duty. But the intervals of darkness to which the moon periodically abandons us have their value also. To many persons they are no doubt unfavourable. The Swindon postman, for instance, as between midnight and dawn he enters, under the shadows of an uncut hedge, upon half-a-mile of newly-laid flints, may well long for the rays of even half a moon ; meanwhile the student of the stars is accepting very gratefully the absence of the moon's light, which, when present, suffices to render extremely unsatisfactory, if not to prevent altogether, any of the more delicate observations.

The Moon has so long been credited with supreme jurisdiction over changes of the weather, that it goes to one's heart, even now, to acknowledge

that Science has dethroned her from that sovereignty. The assertion was, that changes of the weather do often ensue upon changes of the moon, but this statement though undeniable calls to mind a similar alleged sequence of cause and effect in the experiences of the Portsmouth Theatre, under the management of Mr. Crummies. That gentleman assured Nicholas Nickleby that children were frequent in their attendance at the Theatre whenever the *Infant Phenomenon* was in the piece. But as the *Infant Phenomenon* performed industriously every evening the children of Portsmouth were without choice in the matter. So with meteorology and the moon. The latter passes an existence of unceasing change, and the English climate cannot be accused of monotonous constancy ; so that, happen what will, no alteration in the weather can occur at a time when the moon has not some movement on hand to whose influence the alteration might by ingenuity be attributed. Careful scientific experiment has however failed to discover any law of association between the course of the lunar phases and what we call a change in the weather.

But it has been the mariner who has ever found in our faithful attendant a trustworthy and welcome guide. Notwithstanding the variableness of her passage across the sky and the many disturbing influences which complicate the line of that passage, her path has been traced with sufficient certainty to render her position in the sky at any given moment an invaluable index from which may be calculated the position in longitude of a ship in mid-ocean. The determination of longitude is beset with difficulties which do not attend a reading of latitude. The nautical almanac and other tables in the hands of every navigator, describe with all needful precision the exact hour observed at Greenwich at which the moon passes from station to station reckoned at sufficiently short intervals along her monthly path. The commander of a vessel hundreds of miles from Greenwich will not, it may be thought, be much benefitted by a record of such observations. "But the remedy is simple enough. It is to set a watch to Greenwich time at the beginning of a voyage and refer to it whenever Greenwich time is wanted. The difficulty here is purely mechanical. No chronometer can be absolutely depended on, and if it stops the navigator must resort to full lunar observations in all their detail or give up the hope of finding his longitude at all. Most well found ships carry three or even more chronometers, and it is considered unlikely that all should stop ; indeed it is supposed that the error of one is likely in some degree to compensate the error of another, as it is against the doctrine of chances that all the errors should be in the same direction. No chronometer as yet made can be trusted to go with the same accuracy as an observatory clock, but their performance is a wonderful triumph of human skill and ingenuity."

A few words may not be out of place about these almost perfect mechanical time-keepers. It is said that the possibility of telling the longitude by carrying a time piece accurately giving the time under a known meridian was recognised so long ago as the middle of the sixteenth century. The imperfect state of horological machines at that time prevented the accomplishment of the design. The idea however once suggested was valuable and was realised some two centuries later.

"Harrison, an English watch-maker, was at last able to produce a time-piece which was sufficiently accurate to gain the whole reward of £20,000 offered by an Act of Queen Anne.* He reported himself ready for the official trial in 1764, and set sail for Barbadoes. On arrival the error of the chronometer allowing for its given rate, was found to be 48 seconds; and on the return of the vessel to England the instrument was but 54 seconds in error, allowing for its declared rate. A committee was then appointed by the Board of Longitude to take the machine to pieces and report on its construction. They declared themselves satisfied both as to theory and performance, and it was decided that the reward should be paid so soon as a mater could be found to execute Harrison's plan with equal success. This task was undertaken by Mr. Larkom Kendal, and the chronometer made by him on Harrison's lines was sent under charge round the world with Captain Cook. It is now exhibited at the United Service Institution.

"At the present time the number of Government chronometers exceeds a thousand, and the number in private hands must be enormous. So precious are these delicate instruments that they are guarded with the most elaborate precautions. A stranger is hardly permitted to breathe in the same room with them. They are packed in carefully stuffed boxes. The boxes are packed in saw dust, and screwed to a block of wood, which in its turn is bolted to the beams of the deck below. They are brought on board at the beginning of a voyage slung in a handkerchief, and carried by hand. If they travel by rail a fresh system of screws, springs, and elastic outer casings is devised to prevent them from experiencing the smallest jolt. An Admiralty order exists prohibiting the sending of any Government chronometer by any other than a passenger train. So closely are their

* The Act was that of the 12th year of Queen Anne stat 3 chapter 15; of which the preamble runs as follows:—"Whereas it is well known by all that are acquainted with the art of Navigation that nothing is so much wanted and desired at sea, as the discovery of the longitude, for the safety and quickness of voyages, the preservation of ships, and the lives of men: and whereas in the judgment of able mathematicians and navigators several methods have already been discovered, true in theory, though very difficult in practice, some of which (there is reason to expect) may be capable of improvement, some already discovered may be proposed to the publick, and others, may be invented hereafter: and whereas such a discovery would be of particular advantage to the trade of Great Britain, and very much for the honour of this Kingdom; but besides the great difficulty of the thing itself, partly for the want of some publick reward to be settled as an encouragement for so useful and beneficial a work, and partly for want of money for trials and experiments necessary thereunto no such invention or proposals, hitherto made, have been brought to perfection."

performances watched that a minute discrepancy (33 seconds) in a chain of meridian distances, measured by chronometer round the globe, was accounted for by Admiral Fitzroy by the suggestion that the chronometer had been affected by magnetic action in consequence of the ship's head having been for considerable times together in the same direction."

A further illustration of what could be done if the means of determining Greenwich time were perfect is afforded by the following narrative. "When the Great Eastern was carrying a telegraph cable across the Atlantic her captain of course knew the true Greenwich time within a single second, for it was flashed to him from Valentia. He could therefore determine his true place with great accuracy. Now it chanced that on one occasion the Captain of the Great Eastern while thus in telegraphical communication with Greenwich through Valentia, had occasion to search for a buoy which had been left floating (attached to a sunk cable) in a particular latitude and longitude. He made for the spot according to his calculated latitude and longitude, and (according to the account) after the final directions had been given to the effect that the ship should follow a certain course for a certain time he went below to examine a chart. When the time came he was about to go on deck hoping to have made his course so truly that the buoy would be in sight; at that very instant the ship's sail was struck by the buoy." Whether this remarkable coincidence has its foundations in sober fact or in the ingenious conception of some lover of the picturesque, we need not enquire too closely.

But I feel that if we were at this moment in instantaneous communication with Greenwich we should learn that the hour at that meridian is one at which this fragmentary paper ought to be drawing to a close.

Having allowed ourselves a digression not strictly within the range of our subject, let us in conclusion remind ourselves that if the earth and its satellite play but a minor part in the drama of the solar system, that system itself is well-nigh lost in the immensity of the theatre within which its performance is conducted. "The stars are for ever beyond our ken. If the spectroscopes can bring intelligence of their component elements, it is as much as we can hope to attain. For their immeasurable distance removes them from investigation. No action of gravity emanating from those distant luminaries affects the internal economy of the solar system. In the vast eternity of space the sun and his attendant satellites are altogether alone. It is difficult to gaze upon the thousands of stars that brighten the night with their radiance and yet realize our entire isolation. The solar system, with the radius of its orbit stretching from the sun to farthest Neptune, is but a point in a vast solitude. No star is nearer to us than 200 millions of millions of miles. It is difficult in dealing with such enormous numbers to retain a definite impression on the mind. Our powers

of conception are fitted rather to the wants of common life than to a complete survey of the universe. Perhaps an intelligent man may be substituted for a merely formal assent to these numbers if they are considered on a greatly diminished scale. Consider the figures on a scale of one mile to a hundred million. On that scale the sun's distance from the earth would be represented by nearly one mile. Let the sun be represented by a glob on the top of St. Paul's cathedral and the earth by a little ball on the top of the clock tower of the Houses of Parliament. The interior planets would revolve around St. Paul's as a centre; Mercury at the distance of St. Clement's church in the Strand; Venus at the distance of St. Martin's church, Trafalgar Square; Mars would be at Lambeth Bridge; Jupiter at Walham Green; Saturn in the middle of Richmond Park; Uranus a little nearer the centre than Slough; Neptune a couple of miles short of Reading. The outermost planet of the solar system then would on this scale revolve in an orbit comprising London and its neighbourhood as far as Stevenage on the north, Chelmsford and Rochester on the east, and Horsham on the south. On that same scale the nearest fixed star would be nearly as far away as the moon in the actual heavens.

"This inconceivable remoteness shows that the sun and his satellites lie apart in space. They form one whole, inter-dependent on each other, but completely removed, as regards their internal economy, from the influence of any attraction outside."

ON THE ORIGIN OF CHALK FLINTS.

READ BY S. B. DIXON, ESQ., MARCH 2ND, 1881.

THE origin of Chalk Flints has for many years been a subject of great interest to geologists, and much attention has been devoted to it. The great dissimilarity they bore both in composition and form to the chalk with which they were surrounded and the irregularity of their occurrence had no analogy in other rock formations, and rendered the study of them as one peculiar to itself. Comparatively little light however was thrown upon the subject, until the result of the deep sea dredging in the Atlantic Ocean became known, when these revealed the conditions under which a deposit closely analogous to the chalk formation, taking place at the present time. The ooze, or calcareous mud, brought up from the sea bottom bore so close a resemblance, when dried, both in composition and in the substances embedded in it to the chalk, that Drs. Carpenter and Wyville Thomson were led to the opinion that this mud was not only a chalk formation but a continuance of the chalk formation, so that we might almost be said to be still living in the Cretaceous Epoch.

This resemblance must however be qualified in some degree as the analyses of this calcareous mud did not in many respects correspond with that of a piece of chalk, but appeared to be such as the chalk would have shewn before the flints had been formed, in fact it appeared to be similar to what the chalk had been when first deposited in the bed of the Ocean where it was formed.

How the Chalk Flints were formed and how the deep-sea dredgings assist us in explaining their formation are the subject of this paper. These flints occur almost entirely in the upper chalk, the highest (or most recently formed) member of the Cretaceous formation, and occur either as nodules, as continuous beds parallel to the stratification of the chalk, or as dykes filling up some shrinkage crack at some angle to the plane of stratification. I may mention in passing that numerous flints found in the deposits overlying the chalk (the class of gravels) and so common in this district have at some former period been part of the Cretaceous formation, and have since been washed out of it in some one of the many denudations to which these beds have been subjected. The conditions under which the cretaceous rocks were formed are believed to have been a deep sea into which rivers were continuously bringing down the debris of the land through which they had flowed. This debris being composed of particles washed either from the calcareous or lime stone rocks or from the siliceous or sand stone rocks.

There would therefore be a never failing supply of the material of which both the chalk and flints were formed, but many changes took place before the raw substances became converted into the state we now find them. The chalk has been found to have been made up, almost entirely, of the shelly cases of a very minute microscopic rhizopod called globigerina, as a rule from 75 to 80 per cent., and in rare instances as much as 95 per cent. of the substance being composed of it, and recent investigations have shewn that the flints are also of organic origin though more extended processes have taken place in their formation than in that of the surrounding chalk. Flints are composed of nearly pure silica. They are of various colours, due to the presence in extremely minute quantities of other substances as carbon, iron, manganese, &c. The material has been derived from the disintegration of the siliceous rocks, such as granites, porphyries, and the numerous sandstone rocks of previous formations, and, as already mentioned, was brought down by the rivers into the seas during the period of the cretaceous formation.

These seas are known to have been swarming in many parts with sponges of various species, and their remains are found most abundantly in both the chalk and greensand rocks (the rocks that make up the cretaceous formation). A growth of sponge protoplasm derived from these sponges was incessantly going on, and this has without doubt been an important factor in the production of the Chalk Flints. This sponge protoplasm had the faculty of extracting from the water the siliceous matter that it held in suspension, and at the same time of indefinitely propagating itself.

Nearly the whole of the silica thus extracted by the sponge protoplasm, the spicules of the sponges, and other minute dead siliceous organisms sank to the bottom of the seas together with the minute Rhizopods which afterwards formed the chalk. In this condition the silica of these organisms became dissolved, or reduced to a colloid state, and in this state accumulated in moulds formed by the many shells or other outer cases of animals so abundant in the chalk, and ultimately the whole colloid mass thus accumulated consolidated into nodular blocks, or more or less continuous sheets; these again in the ordinary process of sedimentary substances having afterwards become regularly stratified. How the solution of the silica has been effected is not clear, though probably an increased pressure with an elevation of temperature, combined with an increased charge in the sea water of carbonic acid had an important bearing upon it. When however it had become reduced to the colloid condition it could be easily sifted from the water and surrounding substances by a process of endosmose, the chalk matrix acting as a porous medium (similar to the action of a membrane in the human body) and then it would have accumulated in convenient cavities. The colloid condition to which I have referred and on which I have laid so

much stress, as a powerful agent in flint formation requires some explanation. It is a condition which many substances assume when in a state of solution, and silica in this state is especially subject to it. To illustrate its meaning when a solution having a specific gravity greater than water is introduced into a cylindrical glass vessel and water cautiously poured upon it so that the two layers of liquid remain unmoved, the substance dissolved in the lower liquid will gradually pass into the water above, though the vessel has been undisturbed and the temperature unchanged. This gradual passage of the dissolved substance from its original solution in the pure water is called "the diffusion of liquids." It has been found that different substances when in solution diffuse with very unequal velocity and that the diffusion is more rapid with those substances which on solidifying assume their crystalline forms and is slower with non-crystalline bodies which, like gelatine, are capable of forming a jelly.

The substances of greater diffusibility are called *crystalloids* and those of low diffusibility *colloids*. No solution of silica, whether weak or strong has ever shewn a disposition to deposit crystals, but on drying (or solidifying) has always appeared as a colloidal glassy hyalite.

It is true that crystals are occasionally found both in flints and in other siliceous substances, but how they were formed has never yet been explained, though it may have been that the silica from which these crystals were derived solidified from a very weak solution and at an inconceivably low temperature. Glass is an illustration of a colloid, and one of the properties of a colloid body (which is exemplified in glass) is its tendency to adhere to another colloid rather than to a crystalloid.

From the appearance of the successive layers of flints as they are now found in the chalk, it would seem that there were alternating periods during which one of the two predominant animal types, the Foraminifera or chalk forming, and the sponges or flint forming gradually overwhelmed and crushed out the other, over certain areas the strata of chalk in the one case and the flint-bed in the other being the issue of these contests.

How are these conclusions borne out by the evidence afforded us in the Atlantic dredgings? It has been before mentioned that although the conditions under which the chalk is believed to have been formed were similar to these that are now taking place in the bed of the Atlantic, yet the substance brought up in the dredgings is found by analysis to be in many respects very dissimilar to chalk.

The analysis of a sample of chalk taken from the Upper Chalk near Gravesend showed

Carb. of Lime	...	...	...	...	98.52
Insoluble residue (chiefly silica)	...	...	...	...	.65
Sulph. of Lime	...	...	...	...	.14

And very minute quantities of other materials making up the other fractional parts. In this deposit of Upper Chalk the flints occur in the ordinary manner as nodules or as continuous bands. If we compare this analysis with one made of the Atlantic ooze, we shall see at once that the results are quite different.

A complete analysis was made of a sample dredged up during the cruise of the Porcupine, and showed the following :

Carb. of Lime	...	...	...	...	...	50.12
Silica in a soluble condition	...	...	...	...	...	5.04
Fine insoluble gritty sand (rock debris)...						26.77
Ch. of Sodium	...	...	...	...	...	7.48
Organic matter	...	...	...	...	...	4.19
Water	...	...	...	...	...	2.90
Iron	...	...	...	...	...	2.17
Alumina	...	...	...	...	...	1.88

Taking out organic matter, marine salts, and other substances which would probably have been removed before the mud would have become consolidated into hard rock, we may say that the proportions of carb. of lime and silica would be about 60 per cent. of the former to from 30 to 40 per cent. of the latter. In the former illustration the flints have been formed, and in the latter the silica, the substance of which they are to be formed, is still contained in the mass, and a considerable proportion of it consists of the sponge protoplasm and sponge spicules and other organic substances, this organic silica being uniformly distributed through the mass.

These flints are formed in no other beds than the upper chalk, and this formation bears all the traces of having had its origin at the bottom of a deep sea, and it would be under similar conditions that the sponge beds so necessary for the production of these flints were formed. When flinty substances (not true chalk flints) are formed in other beds they are more cherty and devoid of the characteristic amœbiforea outlines that are dependent on the *presence* of and the *combination* of silica, with the accumulation of nearly pure protoplasm still sufficiently recent to have resisted admixture with calcareous or other matter.

The colloid condition assumed by the mass of siliceous matter when in solution is evident from the unique nodulation of the flints, from the homogeneousness, whether occurring as nodules, in continuous sheets paralleled to the stratification or as sluggish overflows into cracks or fissures in the chalk. These peculiarities would not have occurred but in a highly developed colloidal condition. From a mere aqueous solution there would have been a general infiltration into the substance of the chalk, the particles of which would have been cemented together so as to form a siliceous limestone, the fossils would have been infiltrated with silica or a substitution of

silica would have taken place more frequently than we find it. The siliceous mineral, instead of appearing (when not rendered cherty by the presence of some insoluble matter) as a glassy hyalite would have appeared as a compact quartz or alkaline silicate and lastly we should not have had the intermittent occurrence of the flints as if the siliceous matter had been continuously way-laid and absorbed as it descended from the upper waters of the ocean into the colloidal protoplasmic mass resting upon the immediate upper surface of the calcareous deposit.

I will briefly sum up the conclusions to which I wish to draw especial attention :

1.—That the silica of the flints is derived mainly from the sponge-beds which existed in the greatest profusion over the areas occupied by the globigerinæ or calcareous ooze.

2.—That the deep sea-sponges with their surroundings of protoplasmic matter constitute the most important factors in the production of the flints.

3.—That as nearly the whole of the carb. of lime derived from the foraminifera and other like organisms went to build the calcareous stratum or chalk, so nearly the whole of the silica derived both from the deep sea sponges and the surface protozoa went to form the flints.

4.—That the sponges are the only really important contributors to the flint formation.

5.—That the surface layer of sponge protoplasm overlying the calcareous deposit became dissolved and reduced to a colloid condition, a condition generally assumed by silica in solution and by a process of endosmose; the chalk acting as a porous medium, the substance in solution accumulated round convenient cavities as shells, sponges, &c.

6.—That this mass ultimately extended itself into more or less continuous beds or sheets.

7.—That dissimilar as they are in their composition, there is no actual lithological distinction between the chalk and the calcareous mud of the Atlantic Ocean, and the calcareous mud may be, and in all probability, is a continuation of the chalk formation.

THE BOTANICAL SECTION.

THIS section met regularly for an hour every Saturday during preparation in the Easter and Summer Terms. The meetings were held in the Museum, and the entire course was undertaken by the Rev. T. A. Preston. The attendance of members was good throughout, and much useful knowledge was gained; but the advantages of the course would have been considerably increased if members had been at more pains to fill up the schedules regularly, and to supplement the instruction given by private work of their own.

With the exception of two boys, R. W. Rickards and E. B. Badcock, the Botanical work of the School generally has been bad. During the first term, the above two were the *only* ones who did any work at all. During the second term, the Field Days produced a few temporary workers, but still the majority of notices was secured by the same two. During the third term, Badcock alone has done any work. It is mainly owing, therefore, to these two that the very excellent list of notices is due, as well as to the discovery of some additions to our Lists. During the holidays Binck-knoll and Bedwyn were searched, the results proving that if we could examine these places during the month of August it is very possible several discoveries would be made. At the former place there are various ponds, which seem likely to reward careful search, and at the latter the extensive Common, which branches out in various directions, will certainly be found to have some rarities. The "misfortune" of having holidays makes us dependent upon others for notices and discoveries at that time.

Our thanks are due to the Misses Gwillim for noticing plants for us during the Easter Holidays: and to the Rev. J. Sowerby for our notices during October and November.

Names of those whose Initials occur in the following list:—

B. & R.	...	...	E. B. Badcock & R. W. Rickards.
A.E.A.	...	...	A. E. Aldworth.
F.S.A.	...	...	F. S. Alston.
E.B.B.	...	...	E. B. Badcock.
F.B.	...	...	F. Bligh.
H.C.B.	...	...	H. C. Bucknall.
E.K.C.	...	...	E. K. Chambers.
C.E.C.	...	...	C. E. Cooper.
E.B.D.	...	...	E. B. Dawson.
G.W.D.L.	...	...	Rev. G. W. de Lisle.
H.D.	...	...	H. Dobie.
H.C.B.F.	...	...	H. C. B. Foyster.

E.N.G.	...	...	E. N. Gardiner.
H.G.G.	...	...	H. G. Goodacre.
C.T.G.	...	...	C. T. Gregory.
A.S.G.	...	...	A. S. Grove.
K.G.	...	...	Miss K. Gwillim.
T.N.H.S.	...	...	T. N. Hart-Smith, Esq.
E.M.H.	...	...	E. M. Harvey.
H.B.H.	...	...	H. B. Horner, Esq.
E.F. im T.	...	...	E. F. im Thurn, Esq.
A.L.J.	...	...	A. L. Jackson.
W.H.M.	...	...	W. H. Macdonald, Esq.
P.H.M.	...	...	P. H. Maddock.
N.M.	...	...	N. Manders, Esq.
W.M.	...	...	W. Mansell, Esq.
G.T.K.M.	...	...	G. T. K. Maurice.
R.H.N.	...	...	R. H. Nicholson.
J.N.B.	...	...	J. Nugent Bankes.
L.C.W.O.	...	...	L. C. W. Ogbourne.
E.P.	...	...	Miss E. Preston.
A.C.R.	...	...	A. C. Rendle.
H.R.	...	...	H. Richardson, Esq.
R.W.R.	...	...	R. W. Rickards.
H.B.R.	...	...	H. B. Rickards.
C.S.	...	...	Rev. C. Soames.
J.S.	...	...	Rev. J. Sowerby.
C.E.T.	...	...	Rev. C. E. Thorpe.
C.T.R.	...	...	C. Trevor Roper.
B.G.U.	...	...	B. G. Ussher.
J.S.W.	...	...	J. S. Wilson.
P.F.W.	...	...	P. F. Wise.
F.W.Y.	...	...	F. W. Yeates.

NEW SPECIES.

Trifolium striatum—Mildenhall Woodlands, R.W.R.

Ornithopus perpusillus—Savernake Forest, R.W.R.

Inula Helenium—Binck Knoll

Carex pallescens—Stype.

Molinia coerulea—Bedwyn Common.

Nardus stricta—Chiseldon, R.W.R. ; also Bedwyn Common.

NEW LOCALITIES.

Sagina apetala—College Court, E.K.C.

Ononis spinosa—Binck Knoll.

Melilotus arvensis—Black Burney.
Trifolium arvense—Mildenhall Woodlands, R.W.R.
Lathyrus aphaca—Black Burney, B.G.U.
Myriophyllum spicatum—Binck Knoll.
Sambucus Ebulus—Binck Knoll.
Achillea Ptarmica—Chiseldon and Bedwyn Common.
Tanacetum vulgare—Bedwyn.
Senecio crucifolius—Chiseldon.
Campanula Trachelium—Black Burney, *Mrs. Beale*.
 „ **Martinsell**, N.M.
Lycopus europæus—Binck Knoll.
Herminium monorchis—Forest Hill, F.S.A.
 „ **Martinsell** (plentiful in one spot).
Carex ovalis—Styke, Savernake Forest, R.W.R.

Clematis	arvensis.....	May 28 (Chiseldon)
Vitalba	July 19, N.M.	E.N.G. ; full Jn. 8,
Thalictrum		R.W.R.
flavum	full June 28.	Ficaria
Anemone		Feb.3, Feb.25, B & R.
nemorosa ...	Mch. 16, Mch. 17, B.	Caltha
& R.		palustris ...
Myosurus		Mch. 8, B. & R.
minimus ...	about May 3.	Helleborus
Ranunculus		viridis
circinatus ...	full June 18, A.L.J.	Mch. 11.
fluitans	full Oct. 6, J.S.	Aquilegia
peltatus ...	May 5, H.B.R.; E.N.G.	vulgaris ...
pentifolius Ap. 8.		May 30, B. & R.
Drouetii ...	May 28 (Chiseldon).	Nuphar
hederaceus	full Jy. 19.	lutea
sceleratus ...	full Aug. 3.	by June 28, H.C.B.
Flammula ...	May 28 (Chiseldon),	Papaver
R.W.R. ; by Jn. 10.		Rhœas
auricomus	Mch. 22, B. & R.	June 9, E.B.B.
acris	May 3.	dubium
repens	May 6, E.N.G.	June 12, E.B.B.
bulbosus ...	by Ap. 28, K.G.	Lecoqii
parviflorus	about May 1 (cult.)	Jy. 1.
		Chelidonium
		majus
		May 5, B. & R.
		Fumaria
		officinalis ...
		May 12, E.K.C.
		Raphanus
		Raphanistrum
		May 10, H.B.R.
		Sinapis
		arvensis.....
		May 17, G.T.K.M. ;
		P.F.W.

- alba by Jn. 11, E.B.B.
Brassica
 [oleracea] .. May 24, R.W.R.
 Rutabaga ... May 10, A.E.A.; Jn.
 9, E.B.B.
 Rapa by May 4, B. & R.
Sisymbrium
 officinale ... May 10, (New Mill)
 R.W.R.; May 31
 Alliaria Ap. 25, K.G.
Cardamine
 pratensis ... Ap. 6, B. & R.
 hirsuta Feb. 5, Moh. 8, B & R.
 sylvatica ... May 4, B. & R.
Arabis
 thaliana..... about May 3, H.O.B.F.
Barbarea
 vulgaris..... May 4, B. & R.
Nasturtium
 officinale ... May 28 (Chiseldon),
 A.E.A.; by Jn. 15,
 R.W.R.
Draba
 verna Moh. 1, B. & R.
Capsella
 Bursa-pasto-
 ris Moh. 14, B. & R.
Lepidium
 campestre ... May 5, B. & R.
Senebiera
 Coronopus... June 7.
Reseda
 lutea by Jn. 12, H.R.
Helianthemum
 vulgare May 25, R.W.R.
Viola
 odorata Moh. 14, R.W.R.
 hirta Moh. 20, P.H.M.; B.
 & R.
 sylvatica
 a Riviniana Ap. 8, B. & R.
- b Reichenba-
 ohiana ... Moh. 25, R.W.R.
 tricolor ... May 7, B. & R.
 barvensis ... Mch. 19, B. & R.
Polygala
 vulgaris May 9, P.H.M.
 oryptera ... May 10, E.N.G.
 calcareae about May 8, E.N.G.;
 H.B.R.
- [Saponaria**
 officinalis]... Aug. 28.
Silene
 inflata Jn. 4, R.W.R.
 noctiflora ... full Sep. 20.
Lychnis
 vespertina... May 26, R.W.R.
 diurna Ap. 28, W.H.M.
 Flos-cuculi May 28 (Chiseldon);
 Jn. 5, E.B.B.
 Githago ... Jy. 1, H.B.R.
Moenchia
 erecta May 13, G.W.D.L.
- Cerastium**
 glomeratum full May 10.
 triviale May 2, K.G.
- Stellaria**
 aquatica ... Aug. 4.
 media all the year.
 Holostea ... Ap. 18, W.H.M.
 graminea ... Jn. 9; Jn. 12, H.B.R.
 C.T.G.
 uliginosa ... May 10, E.K.C.
- Arenaria**
 trinervis .. May 10, H.B.R.
 serpyllifolia Jn. 7.
- Sagina**
 apetala Jn. 8, E.K.C.
 procumbens May 5, B. & R.
 nodosa Aug. 22, E.P.
- Spargula**
 arvensis..... May 10.

Soleranthus

annuus full Jy. 1.

Hypericum

perforatum Jy. 5, R.W.R.

tetrapterum Jy. 7.

humifusum Jn. 28, R.W.R.

pulchrum ... Jn. 28, R.W.R.

hirsutum ... Jy. 1, P.H.M.

Malva

moschata ... Jy. 2, R.W.R.

sylvestris ... Jn. 7.

rotundifolia May 24.

Tilia

intermedia by Jy. 17, W.M.

Linum

catharticum May 10, R.W.R.; Jn.
12, H.B.R., C.T.G.

Geranium

phæum May 18 (cult.); full
May 31, R.W.R.

pratense ... May 30, F.S.A.

pyrenaicum May 8 (cult.); May
29, R.W.R.

molle May 10, H.B.R.

pusillum ... full Aug. 2.

rotundifolium Jy. 8 (cult.)

dissectum ... May 19, R.W.R.

columbinum Jn. 7.

lucidum May 13, A.E.A.

Robertianum May 8, E.K.C.

Erodium

cicutarium May 10, F.W.Y.

Oxalis

Acetosella .. by Ap. 22, K.G.

Ilex

Aquifolium May 21, B. & R.

Euonymus

europæus ... May 24, R.W.R.

Rhamnus

catharticus Jn. 4, R.W.R.

Acer**Pseudo-plat-**

anus May 5, B. & R.

campestre... May 10, R.W.R.

Ulex

europæus ... till Jy. 1; Sep. 29.

Gallii Ang. 8.

Genista

tinctoria ... Jn. 12, P.H.M.

Sarothamnus

scoparius .. May 12, F.S.A.

Ononis

spinosa full Aug. 3.

arvensis..... Jy. 7.

Anthyllis

vulneraria... May 10, E.K.C.

Medicago

[sativa] ... full Jy. 24, B. & R.

lupulina..... May 4, B. & R.

Melilotus

[arvensis]... by Jy. 7, E.N.G.

Trifolium

pratense ... Ap. 29.

medium ... Jy. 1, H.B.R.

incarnatum full May 28 (Chisel-
don), E.N.G.

arvense ... by Jy. 7, R.W.R.

striatum ... nearly over Jy. 7,
R.W.R.

hybridum ... Jn. 18.

repens May 26.

procumbens Jn. 3, R.W.R.

minus May 10, R.W.R.

Lotus

corniculatus May 17, B. & R.

major Jy. 1.

Astragalus

glycyphyllus nearly over Ang. 3.

Ornithopus

perpusillus full Jn. 26, R.W.R.

Hippocrepis

comosa May 24, R.W.R.

- Onobrychis*
sativa ... May 26, R.W.R.
Vicia
hirsuta ... May 31, E.B.B.; R.H.N.
tetrasperma Jn. 2, F.S.A.
Craeca Jn. 28, R.W.R.
sylvatica ... by Jn. 14, F.S.A.
sepium Ap. 25, K.G.
[sativa] ... May 10 (Pewsey),
H.B.R.; May 12,
E.K.C.
angustifolia May 19, E.B.B.
Lathyrus
Aphaca Jy. 7, B.G.U.
pratensis ... Jn. 2, F.S.A.
sylvestris ... full Aug 3.
Orobus
tuberosus ... Ap. 28, W.H.M.
Prunus
spinosa Ap. 18, C.E.T.
Avium Ap. 29, C.E.C.; G.T.K.M.
Cerasus about May 8, A.E.A.,
H.B.R.
Spiraea
Ulmaria ... Jn. 18, R.W.R.
Filipendula Jn. 8 (cult.); Jn. 24,
P.H.M.
Agrimonia
Eupatoria ... Jn. 9, E.B.B.; Jn. 18,
P.H.M.; Jn. 30,
C.E.C.
odorata Jy. 5, R.W.R.
Poterium
Sanguisorba May 4, B. & R.
Alochemilla
arvensis ... May 5, A.E.A.
vulgaris ... May 5, B. & R.; E.N.G.
Potentilla
Fragaria-
trum Nov. 29, 1880, B. & R.
Tormentilla May 5, B. & R.
reptans Jn. 4, R.W.R.
anserina ... May 19, R.W.R.
Fragaria
vesca May 5, B. & R.; E.N.G.
Rubus
Idæus ... May 30, B. & R.
discolor ... Jy. 19.
corylifolius Jn. 23.
oësius May 29, F.B.; Jn. 8,
P.H.M.
Geum
urbanum ... May 15, R.W.R.
intermedium full Jy. 1.
rivale ... May 8.
Rosa
tomentosa ... Jn. 14, R.W.R.
rubiginosa .. full Jy. 1, E.N.G.
canina Jn. 5, E.M.H.
arvensis Jn. 23, R.W.R.
Cratægus
Oxyacantha May 10 (New Mill),
R.W.R.; May 17.
Pyrus
Malus
a. acerba .. May 8, B. & R.
Lythrum
Salicaria ... full Aug. 3, W.H.M.
Epilobium
angustifo-
lium June 20 (cult.); by
Jy. 5, R.W.R.
hirsutum ... Jy. 13, P.H.M.
parviflorum by Jy. 7, E.N.G.;
R.W.R.
montanum Jn. 4.
palustre Jy. 1, E.N.G.
Cirœa
lutetiana .. Jn. 26 (in garden)
by Jy. 1.
Myriophyllum
spicatum ... full Aug. 3.

- Callitriche**
 verna Ap. 8.
 b. platycarpa full Jn. 18.
- Bryonia**
 dioica May 28 (Chiseldon),
 R.W.R.; about same
 date at Marlborough
- Ribes**
 Grossularia Ap. 8, B. & R.
 rubrum Ap. 19, K.G.
 nigrum full May 10.
- Sedum**
 Telephium
 b. Fabaria Aug. 8.
 acre Jn. 12.
- Saxifraga**
 tridactylites Ap. 28, K.G.
 granulata ... Ap. 29, K.G.
- Chrysosplenium**
 oppositifolium
 lium full May 10, E.K.C.
- Sanicula**
 europæa ... May 10, R.W.R.,
 May 21
- Helosciadium**
 nodiflorum Jy. 7, A.E.A.
 inundatum Jy. 1, E.N.G.
- Sison**
 Amomum ... Aug. 8
- Ægopodium**
 Podagraria May 27, R.W.R.
- Bunium**
 flexuosum ... May 19, E.B.B.
- Pimpinella**
 Saxifraga ... Jn. 11, E.B.B.
- Sium**
 angustifolium Jy. 7, E.N.G.; Jy. 23
- Oenanthe**
 fistulosa Aug. 3 (full)
 crocata Jn. 6, R.W.R.
- Æthusa**
 Cynapium ... Jn. 14, Jn. 30, R.W.R.
- Silaus**
 pratensis ... Jn. 11 (Bishop's
 Cannings) E.K.C.
- Angelica**
 sylvestris ... Jy. 12
- Pastinaca**
 sativa Jn. 9, E.B.B.
- Heracleum**
 Sphondylium (May 10, E.K.C.) by
 Jn. 7
- Daucus**
 Carota ... Jn. 8, R.W.R.
- Torilis**
 infesta by Jy 6, R.W.R.
 Anthriscus Jy. 1 (Martinsell)
 E.N.G.; Jy. 5,
 R.W.R.
 nodosa just over Aug. 15
- Chærophyllum**
 sylvestre ... Ap. 8, B. & R.; Ap. 19
 temulum ... May 31, B. & R.;
 R.H.N.
- Scandix**
 Pecten-Veneris by May 10, F.W.Y.
- Conium**
 maculatum by Jy. 1, E.N.G.
- Hedera**
 Helix Oct. 2, E.B.B.
- Cornus**
 sanguinea ... nearly on May 28
 (Chiseldon) P.H.M.
 Jn. 7; Jn. 16,
 R.W.R.
- Adoxa**
 Moschatellina Mch. 14, B. & R.
- Sambucus**
 nigra May 24, R.W.R.
 Ebnus full Aug. 8
- Viburnum**

- Opulus* Jn. 4, R.W.R.
Lantana ... Ap. 22, K.G.; May 2,
 C.E.O., G.T.K.M.
Lonicera
Perielyme-
num Jn. 17, C.T.R.,
 L.C.W.O.
Galium
cruciatum ... Mch. 27, B. & R.
verum Jn. 28, P.H.M., R.W.R.
Mollugo Jn. 11, E.B.B.
saxatile .. Jn. 4, T.N.H.S., P.H.M.
palustre ... Jn. 21, E.N.G.
Witheringii Jy. 1
Aparine May 10, F.W.Y.
tricornis ... by Jn. 9
Asperula
odorata May 1, K.G.
cynanchica Jn. 2, R.W.R., Jn. 12,
 B. & R., C.T.G.
Sherardia
arvensis May 21, B. & R.
Valeriana
dioica May 5, P.H.M.
officinalis ... Jn. 4, R.W.R.; Jn. 10
Valerianella
olitoria Feb. 19, R.W.R.; May
 10, H.B.R.
dentata Jn. 18, F.W.Y.
Dipsacus
sylvestris ... Aug. 1
Scabiosa
succisa Aug. 4 (Chiseldon);
 Aug. 8
columbaria Jn. 18, P.H.M.
arvensis ... Jn. 11, J.N.B.
Carduus
nutans Jn. 8, R.W.R.; Jn.
 18, R.W.R.
crispus May 31, L.C.W.O.
lanceolatus Jy. 7
eriphorus by Aug. 2
palustris ... May 10 (Pewsey)
 A.E.A.; Jn. 7
tuberosus ... Jy. 8 (cult.)
acaulis ... Jn. 24, P.H.M.
arvensis ... Jy. 7, J.S.W.
Carlina
vulgaris Jy. 19
Arotium
majus Jy. 24, B. & R.
minus Aug. 1
intermedium Aug. 2
nemorosum Jy. 25, B. & R.
Serratula
tinctoria ... Jy. 22
Centaurea
nigra Jn. 18, R.W.R.; Jy. 1
Scabiosa ... Jn. 14, R.W.R.;
 T.N.H.S.
Cyanus Jn. 14, G.W.D.L.;
 Jy. 1, H.D.
Chrysanthemum
segetum Jn. 24, F.S.A.
Leucanthe-
mum May 21, B. & R.,
 F.S.A.
Matricaria
inodora May 5, &c.; Jn. 16
Tanacetum
vulgare Aug. 6.
Anthemis
Cotula Jn. 12, E.B.B., E.K.O.
Achillea
Millefolium May 29, F.W.Y.
Parnassia ... Jy. 13 (cult.); full
 Aug. 4
Artemisia
vulgaris Aug. 8.
Filago
germanica .. Jy. 23
Gnaphalium

- uliginosum Aug. 8.
Senecio
 vulgaris..... all year.
 sylvaticus... full Aug 14.
 erucifolius... nearly out Aug. 4.
 (Chiseldon); Aug. 22
 Jacobæa ... Jn. 25 R.W.R.
 aquaticus ... Jn. 28; Jy. 7.
 campestris May 28 (Chiseldon),
 A.E.A.; Jy. 1, E.K.C.
Bidens
 cernua full Sep. 10.
Inula
 Helenium ... full Aug. 3.
 Conyza by Aug. 15.
 dysenterica Aug. 3, W.H.M.
Bellis
 perennis ... all year.
Erigeron
 acris Aug. 8.
Solidago
 Virga-aurea Aug 2.
Tussilago
 Farfara Feb. 26, B. & R.
Petasites
 vulgaris..... Feb. 24, B. & R.
Eupatorium
 cannabinum nearly out July 24,
 R.W.R.; Aug. 2.
Lapsana
 communis .. Jn. 23, R.W.R.
Hypochoeris
 radicata ... May 30, B. & R.
Leontodon
 hirtus Jn. 30.
 hispidus..... May 31, E.B.B.
 autumnalis Jn. 18, E.B.B.; Jn.
 25, R.W.R.; Jy. 7.
 R.H.N.
Picris
 hieracioides Aug. 3.
- Helminthia**
 echioides ... Aug. 3.
Tragopogon
 pratensis ... full May 30, B. & R.
Taraxacum
 officinale ... all year.
Sonchus
 oleraceus ... Sep. 20.
 asper by Jn. 3, R.W.R.
 arvensis ... Jy. 7, R.W.R.
Crepis
 virens May 31; Jn. 3,
 R.W.R.
Hieracium
 Pilosella ... May 29 E.K.C.
 vulgatum ... Jy. 7, E.K.C.
 boreale Aug. 8.
Phyteuma
 orbiculare .. Aug. 3.
Campanula
 glomerata . Jn 28, P.H.M.; Jy.
 7, R.W.R.
 Trachelium Jy. 8, Mrs. Beale.
 rotundifolia Jy. 4, E.B.B.; Jy. 7,
 E.K.C.
Specularia
 hybrida by Jy. 1, E.N.G.
Calluna
 vulgaris ... Aug. 8.
Fraxinus
 excelsior ... Mch. 24 (stamens).
Ligustrum
 vulgare ... Jn. 18.
Vinca
 major May 4, B. & R.
 minor..... Mch. 15, B. & R.
Erythraea
 Centaurium Jy. 12, P.H.M.
Gentiana
 Amarella ... Aug. 22.
 campestris full Sep. 29.

- Menyanthes
 trifoliata ... full Jn. 10.
 Polemonium
 coeruleum ... cold. bud May 10,
 R.W.R.
 Convolvulus
 arvensis..... Jn. 21, R.W.R.
 sepium by Jy. 8.
 Solanum
 Dulcamara Jn. 14, R.W.R.
 Verbascum
 Thapsus ... by Jn. 30, F.S.A.
 Scrophularia
 Baltisii Jn. 18 (Stype), Jy. 9.
 nodosa May 27, R.W.R.
 Linaria
 Cymbalaria May 6, F.W.Y.
 Elatine full Oct. 10.
 spuria Aug. 8.
 vulgaris..... Jy. 2, B. & R.
 minor..... Jn. 2, A.E.A.
 Veronica
 hederifolia .. all the year.
 polita..... May 20.
 agrestis full Aug. 4.
 Buxbaumii all the year.
 arvensis..... all the year.
 serpyllifolia Ap. 8, B. & R. ; May
 5, A.E.A.
 officinalis ... Jn. 9.
 Chamædrys Ap. 26, K.G.
 montana ... May 24.
 scutellata ... Jn. 30, R.W.R.
 Anagallis ... Jn. 18.
 Beccabunga May 28 (Chiseldon),
 E.N.G., E.B.B. ;
 May 31.
 Euphrasia
 officinalis ... Jn. 8, Jn. 12, H.B.H.
 C.T.G.
 Bartsia
 Odontites ... Jy. 1, H.B.R.
 Pedicularis
 sylvatica ... May 15, H.C.B.
 Rhinanthus
 Crista-galli May 26, J.S.W.
 Melampyrum
 pratense ... May 29, P.H.M.
 Lathræa
 squamaria... May 2, K.G.
 Orobanche
 elatior Jy. 7.
 minor..... Jn. 18, F.W.Y.
 Verbena
 officinalis ... Jy. 7, R.W.R.
 Lycopus
 europæus ... by Jy. 21, W.H.M.
 Mentha
 hirsuta Aug. 3.
 sativa Aug. 6.
 arvensis... Jy. 15, R.W.R.
 Thymus
 Serpillum .. Jn. 7, R.W.R.
 Chamædrys by Jy. 8.
 Origanum
 vulgaro by Aug. 3 (Binck-
 Knoll)
 Calamintha
 Clinopodium Jy. 7, R.W.R.
 menthifolia Aug. 8.
 Nepeta
 Glechoma ... Moh. 30, B. & R.
 [Salvia
 Verbenaca] May 24, R.W.R.
 Prunella
 vulgaris ... Jn. 25, R.W.R.
 Scutellaria
 galericulata by Jy. 7, E.B.B.
 minor..... by Aug. 8.
 Ballota
 nigra Jy. 7, R.W.R.
 Stachys

- Betonica* ... Jn. 18 (Martinsell),
 E.B.B.; by Jy. 7,
 R.W.R.
palustris ... Jn. 25, R.W.R.; Jy. 23
sylvatica ... Jn. 14, R.W.R.
arvensis..... Jy. 7, E.K.O.
Galeopsis
Ladanum ... Jy. 7, E.N.G.
Tetrahit ... Jy. 7, H.B.B.
Lamium
amplexicaule May 20, B. & R.
purpureum all year.
album Moh. 10, B. & R.
Galeobdolon May 2, K.G.
Ajuga
reptans May 5, B. & R.
[Echium
vulgare] ... by Jn. 23, E.B.B.
[Pulmonaria
officinalis]... Moh. 17 (cult.)
Lithospermum
officinale ... May 10 (Pewsey),
 E.K.O.; May 17,
 T.N.H.S.
arvense May 24, R.W.R.
Mycotis
palustris ... May 28 (Chiseldon),
 R.W.R.; Jn. 7.
arvensis..... May 5, B. & R.
collina Ap. 3, B. & R.
versicolor ... May 5, E.N.G.
Anchusa
arvensis..... Jy. 1, H.B.B.
[Borago
officinalis]... Jn. 22 (cult.)
Symphytum
officinale ... Ap. 21, C.E.T.;
 G.T.K.M.
Cynoglossum
officinale ... May 29, F.B.
Primula
vulgaris..... all year.
b. caulescens Ap. 24, K.G.
officinalis ... Ap. 6, B. & R.
Lysimachia
Nummularia Jn. 23 (cult.); full
 Jy. 19.
nemorum ... May 17, F.S.A.
Anagallis
arvensis..... Jn. 15, R.W.R.
Plantago
major..... Jn. 9, E.B.B.; Jn. 15
 R.W.R.
media..... May 29, E.B.B.;
 E.K.O.
lanceolata ... by Ap. 29, K.G.
Chenopodium
album Jn. 24, T.N.H.S.
B. Henrious full May 24
Atriplex
angustifolia Jy. 22
Rumex
conglomeratus Jn. 18, E.B.B.; Jy. 1
a. viridis ... Jn. 18, E.B.B.; Jy. 7
obtusifolia Jn. 7, R.W.R.; Jn.
 18, R.W.R.
crispus Jn. 9
Hydrolap-
thum Jy. 20
Acetosa..... May 10, E.B.B.
Acetosella ... May 5, B. & R.;
 E.N.G.
Polygonum
Fagopyrum full Aug. 1
Convolvulus Jn. 13, R.W.R.
aviculare ... Jn. 13, R.W.R.
Hydropiper Aug. 8
Persicaria ... Jy. 7, E.N.G.
lapathifo-
lium Jy. 12
amphibium Jy. 19

- Bistorta*..... coloured bud May 10
Daphne
 Mezereum... Mch. 6 (cult.)
 Laureola ... Feb. 5, B. & R.
Thesium
 humifusum Sept. 4, W.H.M.
Asarum
 europæum... Ap. 30 (cult.)
Buxus
 sempervirens Mch. 19
Euphorbia
 Helioscopia Jn. 9, R.W.R.
 amygdaloi-
 des May 2, K.G.
 Peplus Jn. 11, E.B.B.; Jy. 8
 exigua Jn. 15, R.W.R.
Mercurialis
 perennis .. barren Feb. 10;
 fertile Mch. 6,
 B. & R.
Urtica
 dioica May 27, R.W.R.
 urens Jn. 7
Humulus
 Lupulus ... Aug. 3, E.F. im T.
Ulmus
 suberosa .. Mch. 19, B. & R.
 montana ... Mch. 19, B. & R.
Quercus
 Robur May 10, E.B.B.;
 May 17.
Fagus
 sylvatica ... May 11, A.E.A.
Corylus
 Avellana ... barren, Feb. 6; fer-
 tile, Feb. 5, B. & R.
Carpinus
 Betulus May 11, A.E.A.
Salix
 fragilis May 5.
 triandra... .. Ap. 8.
- purpurea* ... May 7.
viminialis ... Mch. 19, B. & R.
caprea Mch. 22, B. & R.
Pinus
 sylvestris ... May 28.
Juniperus
 communis... bud May 10, E.K.C.
Taxus
 baccata Mch. 12, B. & R.
Sparganium
 ramosum ... full Jn. 18.
 simplex Aug. 3.
Arum
 maculatum May 1, K.G.
Potamogeton
 natans Jn. 18, T.N.H.S.
 densus Aug. 3.
Zannichellia
 palustris ... Jn. 18.
Sagittaria
 sagittifolia Jy. 13, W.H.M.
Alisma
 Plantago ... Jn. 21, B. & R.
Butomus
 umbellatus full Aug. 4, W.H.M.
Elodea
 canadensis Aug. 22.
Orchis
 pyramidalis Jn. 23, B. & R.
 ustulata ... Jn. 13, H.G.G.
 Morio..... May 12, F.S.A.
 mascula..... Ap. 28, W.H.M.
 incarnata ... May 28 (Chiseldon),
 H.B.R.; Jn. 10 E.P.
 latifolia ... by Jn. 10
 maculata ... May 28 (Chiseldon),
 A.S.G.; Jn. 7, P.H.M.
Gymnadenia
 conopsea ... Jn. 19, P.H.M.
Habenaria
 viridis Jn. 18, E.N.G.

- bifolia* Jn. 12, E.K.C.
oblorantha May 29, P.H.M.; Jn. 9
Herminium
Monorchis .. Jn. 21, F.S.A.
Ophrys
spifera Jy. 1, H.B.R.
Spiranthes
autumnalis Sep. 20, E.B.B.
Listera
ovata May 22.
Neottia
Nidus-avis May 29, P.H.M.
Epipactis
latifolia Aug. 2.
Cephalanthera
grandiflora full Jn. 12, E.K.C.
Iris
foetidissima about Jy. 2 (cult.)
Pseudacorus Jn. 3, E.B.B.
Narcissus
Pseudo-nar-
cissus ... Moh. 12.
Galanthus
nivalis Feb 3, B. & R.
Tamus
communis ... May 28 (Chiseldon),
P.H.M.; Jn. 4,
R.W.R.
Polygonatum
multiflorum May 17, T.N.H.S.
Convallaria
majalis May 23 (cult.)
Ruscus
aculeatus ... Dec. 8, 1880, B. & R.
Talipa
sylvestris ... May 5, B. & R.
Oroithogalum
umbellatum May 30 (cult.)
pyrenaicum Jn. 18, E.B.B.
Scilla
nutans Ap. 17, K.G.
- Allium**
vineale Jy. 1, A.C.R.
ursinum ... May 5, B. & R.
Colobicum
autumnale .. Aug. 18, C.S.; Sep.
13.
Luzula
pilosa Moh. 19, B. & R.
campestris Ap. 21, B. & R.
multiflora ... May 5, B. & R.
Juncus
conglomerata
tus Jn. 19, E.B.B.; Jy. 1.
effusus Jn. 28.
glauca Jy. 7, E.N.G.
lamprocar-
pus Jn. 18.
Scirpus
palustris ... May 28 (Chiseldon),
R.W.R.
Carex
disticha ... by Jn. 10.
paniculata May 7, B. & R.
vulpina May 28 (Chiseldon),
E.N.G.
muricata ... May 29, R.W.R.
divulsa full Jn. 18.
remota full Jn. 18.
ovalis Jn. 18, E.N.G.
glauca May 4, B. & R.
pilulifera ... full Jn. 18.
præcox Ap. 24, K.G.
pallescens ... Jn. 18 (nearly over).
pendula May 22 (cult.)
sylvatica ... May 5, B. & R.
flava May 28, T.N.H.S.
hirta May 28, E.B.B.
paludosa ... May 7, B. & R.
riparia by May 7, E.N.G.
Anthoxanthum
odoratum ... Ap. 28, K.G.

Digraphis

arundinacea Jn. 15, R.W.R.

Alopecurus

agrestis May 27, R.W.R.; Jy. 1

geniculatus Jn. 7.

pratensis ... May 1.

Phleum

pratense ... Jn. 18, E.B.B.

b. nodosum full Jy. 1, E.N.G.

Agrostis

alba Jn. 28, E.N.G.

vulgaris ... Jn. 18.

Phragmites

communis.. Aug. 18.

Milium

effusum ... May 17, B. & R.

Aira

caespitosa ... Jn. 10.

flexuosa Jn. 30, R.W.R.

Avena

flavescens ... Jn. 7.

pubescens... May 10 (Pewsey),
E.K.C.

pratensis ... May 31.

elatior May 31.

Holcus

mollis May 31.

lanatus May 8, E.B.B.; May
31, E.B.B., R.H.N.

Triodia

decumbens Jn. 30.

Koeleria

cristata ... May 31.

Molinia

caerulea ... Aug. 18.

Melica

uniflora May 10.

Glyceria

plicata May 10 (Pewsey),
E.B.B.

aquatica ... Jn. 23, R.W.R.

Poa

annua all the year.

nemoralis ... Jy. 7.

pratensis ... May 3, E.N.G.

trivialis..... May 28, E.B.B.

Briza

media May 21, R.W.R.

Cynosurus

cristatus ... May 10 (Pewsey),
E.B.B.; May 28.

Dactylis

glomerata... May 10 (Pewsey),
R.W.R.; May 20.

Festuca

ovina..... May 10 (Pewsey),
E.N.G.; May 20.

rubra May 10 (Pewsey);
May 20.

elatior Jy. 1.

b. arundina-

cea Jn. 7; Jn 15, R.W.R.

pratensis ... May 31.

b. loliacea Jn. 28; Jy. 20.

Bromus

giganteus ... Jy. 12.

asper Jn. 7, R.W.R.; Jn.
15.

erectus May 5, B. & R.

sterilis May 10 (Pewsey),
E.N.G.; May 12,

E.K.C.

racemosus... May 23.

mollis May 4, B. & R.

Brachypodium

sylvaticum Jn. 30, E.N.G.

Triticum

caninum ... Jn. 28.

repens Jn. 21, B. & R.

Lolium

perenne ... May 7.

italicum ... Jy. 12.

Hordeum	Lunaria.....
<i>pratense</i> ... Jn. 28, E.N.G.	May 5, P.H.M.; May 29.
Nardus	Equisetum
<i>stricta</i> May 28 (Chiseldon), B.W.B.	<i>arvense</i> ... fertile Ap. 8.; barren May 7.
Ophioglossum	<i>palustre</i> ... bud May 10, E.K.C.
<i>vulgatum</i> ... May 5.	<i>limosum</i> ... May 21, A.E.A.
Botrychium	

Hepatica triloba —Feb. 4.	Cornus mascula —Mch. 11.
Eranthis hiemalis —Jan. 31.	Syringa vulgaris (Lilac)—May 13.
Corydalis solida —Mch. 21.	Lonicera caprifolium , full—May 28.
Æsculus Hippocastanum —May 11.	Symphoricarpos racemosus —May 28.
Cytisus Laburnum —May 22.	Lycium Barbarum —May 23.
Pyrus Aucuparia —May 14, C.E.T.	Larix europæa —Mch. 19.
Pyrus Japonica —Ap. 4.	Scilla Siberica —Feb. 28.
Apricot —Mch. 17.	Erythronium Dens-canis —Mch. 14.
Peach —Mch. 17.	Wheat —Jn. 26.
Plum —Mch. 28.	Oats —Jn. 29.
Ribes Sanguineum —Mch. 21.	Barley —Jn. 19.
Staphylea pennata —May 12.	Rye —May 27.
Saxifraga crassifolia —Mch. 16.	

ORNITHOLOGICAL SECTION.

IN making a report of the Ornithological proceedings of the Society, we must first mention that in addition to the inauguration of other sections, an Ornithological Section has been formed under the auspices of Rev. J. P. Way, assisted by E. K. Cardew. The number was limited to a dozen or thereabouts for convenience in working.

Meetings were held fortnightly during the Summer Term. Papers were read or lectures given on various subjects, commencing with the structure of the bird and passing on to the habits, &c., of some of the species. In the Christmas Term Mr. Coleman gave the section some instruction in the art of birdskinning. This art will be very useful if any make ornithology a regular study and indeed necessary if they should ever be in a place remote from Taxidermists where the rarer specimens are more likely to be found.

The year has not been a very eventful one as far as regards "Notices." An unusually large number of Grasshopper Warblers seem to have visited this part during the summer. And after the great gale of October 14th, several sea birds were found driven inland by its violence. The stormy petrel has never before been found here.

G. T. K. Maurice deserves great credit for his energy in the amount of observations he has made; as also C. E. Cooper. But the number of observers has been very small and we hope that next year there will be more.

Appended is the more detailed report of the notices :—

Key to Initials.

H O.B.	...	...	H. O. Berwick.
F.B.	...	...	F. Bligh.
C.E.C.	...	...	C. E. Cooper.
C	...	...	Mr. Coleman.
H R.F.	...	...	H. R. Freeman.
C.H.	...	...	C Hartley.
N.M.	...	...	N. Masterman, Esq.
G T.K.M.	...	...	G. T. K. Maurice.
G A.C.S.	...	...	G. A. C. Sim.
A.W.A.W.	...	...	A. W. A. Williams.
J.P.W.	...	...	Rev. J. P. Way.

- Kestrel—eggs May 2, G.T.K.M. and C.E.C.
 Sparrow Hawk—eggs May 14, G.T.K.M. and C.E.C.
 Long-eared Owl—egg May 28, F.B.
 Tawny Owl—eggs April 2, A.W.A.W.; young April 28, G.T.K.M.
 Spotted Flycatcher—eggs May 23, A.W.A.W.
 Song Thrush—eggs April 21, G.T.K.M. and C.E.C.
 Blackbird—eggs April 31, G.T.K.M. and C.E.C.
 Hedge Accentor—eggs March 24, G.T.K.M. and C.E.C.
 Redstart—seen April 9, N.M.
 Whinchat—egg June 18, H.B.F.
 Grasshopper Warbler—2 nests May 28, C.H. and A.W.A.W.; May 29, H.B.F.
 Sedge Warbler—egg May 21, C.E.C.
 Reed Warbler—egg May 30, G.A.C.S.
 Garden Warbler—5 eggs May 24, G.T.K.M.
 Whitethroat—seen May 1, N.M.; 5 eggs May 24, C.H.; young June 19, H.B.F.
 Willow Warbler—egg June 6, H.B.F.
 Chiff-Chaff—eggs May 20, A.W.A.W. and C.H.
 Greater Tit—eggs April 2, G.T.K.M. and C.E.C.
 Blue Tit—eggs April 30, G.T.K.M. and C.E.C.
 Pied Wagtail—young May 24, G.T.K.M.
 Yellow Wagtail—seen April 29, G.T.K.M. and C.E.C.
 Meadow Pipit—? May 24, G.T.K.M.
 Black-headed Bunting—seen February 10, H.B.F.
 Chaffinch—eggs May 22, F.B.; young July 4, G.T.K.M.
 House Sparrow—young May 28, G.T.K.M.
 Greenfinch—eggs May 21, H.B.F.
 Linnet—eggs May 13, H.C.B.
 Bullfinch—eggs May 28, H.C.B.
 Starling—eggs May 2, G.T.K.M. and C.E.C.
 Rook—building February 7, J.P.W.; March 24, G.A.C.S.
 Jackdaw—eggs April 21, G.T.K.M. and C.E.C.
 Magpie—eggs April 22, G.T.K.M. and C.E.C.
 Jay—eggs May 14, H.C.B.
 Creeper—eggs April 24, C.E.C.
 Wren—eggs May 24, G.T.K.M.; young July 11, G.T.K.M.
 Cuckoo—heard April 12, C.; egg in robin's nest May 28, F.B.
 Swallow—killed March 23, C.; eggs June 6, C.E.C.; last seen November 7, C.
 Martin—seen March 24, J.P.W.; young July 1, G.T.K.M.; young brood again
 October 12, G.T.K.M.
 Sand Martin—seen April 22, G.T.K.M. and C.E.C.
 Swift—seen May 1, N.M.; eggs June 1, C.E.C.

Ring Dove—eggs April 8, G.T.K.M. and C.E.C.; young May 2,
 Stock Dove—eggs March 29; young May 2, G.T.K.M. and C.E.C.
 Turtle Dove—eggs May 14, C.H.
 Peewit—seen April 21, G.T.K.M. and C.E.C.
 Land Rail—heard April 29, N.M.
 Moorhen—egg April 22, G.T.K.M. and C.E.C.; young June 8, G.T.K.M.
 Little Grebe—egg May 24, G.T.K.M.; March 26, found dead from swallowing
 a fish; young July 1.

Some rarer birds seen this year :—

Common Tern—Jan. 19, shot at Kennet.
 Blue Merlin—April 15, found dead.
 Ringed Dotterel—Aug. 12, shot at Kennet.
 Stormy Petrel—after the gale of Oct. 14th, found dead near Panterwick.
 Kittiwake—shot at Brimslade.
 Arctic Tern—found near Canal at Wootton Rivers.
 Richardson's Skua—shot near Martinsell.
 Bar-tailed Godwit—same month, shot near Overton.

The report of these comes from Mr. Coleman.

Besides these a Sandpiper was seen near Mildenhall in May by G.T.K.M.;
 and a flock of Curlew were heard passing over the College at 11
 p.m. on night of Oct. 18th by J.P.W.

ENTOMOLOGICAL SECTION.

DURING Lent term, 1881, this section met regularly on alternate Tuesday evenings after Chapel. The number of members was about 20, and the attendance fairly regular. With a view to the Stanton prize, papers were read on the successive families of Lepidoptera, and hints given for the finding and collecting of individual species of interest. Maddock, Blandford, and Alston were most energetic in carrying on the work of the meetings, and papers were read by them, and by the President, by Daltry and by Giveen. Notices were exhibited at each meeting, followed by occasional discussions. During the summer term the greater quantity of notices and material for questions rendered any system of papers less feasible. Two or three were contributed on the Microlepidoptera by Maddock, and Blandford, and one on wing-markings by the President. On two occasions the Section took wing to Rabley copse for the purpose of sugaring, but without great success. There was some falling off in attendances. After the holidays the time of meeting was changed to alternate Saturdays in preparation, but it was determined, after the Stanton prize collections were shewn up, to discontinue them until the opening of the next season. The Section will recommence next term, when it is hoped that all who take an interest in the subject will join, and display a somewhat less silent appreciation. There has been good work done, but by too few hands, and it should be remembered that as the section exists for all, each individual should contribute his quota towards promoting it.

COLLECTORS, 1881.

J.A.	...	...	J. Acton.
F.S.A	...	...	F. S. Alston.
G.S.B.	...	...	G. S. Back.
V.A.B.	...	...	V. A. Bankes.
G.G.B.	...	...	G. G. Beale.
G.A.H.C.B.	...	...	G. A. H. C. Berkeley.
B.T.M.B.	...	...	B. T. M. Berkeley.
H.C.B.	...	...	H. C. Berwick.
W.F.B.	...	...	W. F. Blandford.
E.K.C.	...	...	E. K. Chambers.
W.P.C.	...	...	W. P. Chataway.
W.H.C.	...	...	W. H. Coats.
C. ...	...	...	Mr. Coleman.

C.E.C.	...	...	C. E. Cooper.
F.B.C.D'O.	...	...	F. B. C. D'Chair.
E.E.D'S.	...	...	E. E. D'Satgé.
H.D.	...	...	H. Dobie.
H.G.G.	...	...	H. G. Goodacre.
T.N.H.S.	...	...	T. N. Hart-Smith, Esq.
G.H.	...	...	G. Heaton.
P.H.S.	...	...	P. Horton-Smith.
C.B.L.	...	...	C. B. Lias.
P.H.M.	...	...	P. H. Maddock.
N.M.	...	...	N. Manders, Esq.
A.E.R.M.	...	...	A. E. R. Mangles.
G.T.K.M.	...	...	G. T. K. Maurice.
A.G.P.	...	...	A. G. Palgrave.
E.P.	...	...	E. Pedder.
T.A.P.	...	...	Rev. T. A. Preston.
W.B.P.	...	...	W. B. Price.
E.W.R.	...	...	E. W. Richards.
R.W.R.	...	...	R. W. Rotheram.
C.T.S.	...	...	C. T. Sidgwick.
W.G.G.S.	...	...	W. G. G. Stokes.
H.V.T.	...	...	H. V. Thomson.
B.G.U.	...	...	B. G. Ussher.
W.N.V.	...	...	W. N. Villiers.
H.W.	...	...	H. West.

* Means caught at sugar

R H O P A L O C E R A.	<i>Cœnonympha Pamphilus</i> —May 17,
<i>Gonepteryx-Rhamni</i> —Male, Moh. 17,	W.F.B.
P.H.M.; female, May 7,	<i>Apatura Iris</i> —July 27, C.
P.H.M.	<i>Cynthia Cardui</i> —May 21 (hibernated)
<i>Pieris Brassicæ</i> —May 9th, W.F.B.	W.G.G.S.
<i>Rapæ</i> —Ap. 8, T.A.P.	<i>Vanessa Atalanta</i> —July 18, J.A.
<i>Napi</i> —Ap. 17, N.M.	<i>Io</i> —Moh. 17 (hyb.), P.H.M.
<i>Anthocharis Cardamines</i> —Ap. 28,	<i>Urticæ</i> —Jan. 28, P.H.M.; June
G.T.K.M.; C.E.C.	15 (bred), P.H.M.
<i>Arge Galathea</i> —June 30, F.S.A.	<i>Argynnis Paphia</i> —(Ot.), Jy. 4, W.H.R.
<i>Lasiommata Ægeria</i> —May 8, P.H.M.;	(bred) Jn. 20, P.H.M.
F.S.A.	<i>Adippe</i> —June 26, G.S.B.
<i>Janira</i> —June 15, H.W.	<i>Aglaia</i> —June 26, G.S.B.
<i>Hyperanthus</i> —June 26, H.W.	<i>Selene</i> —May 22, P.H.M.

- Euphrosyne**—May 12, W.F.B.; F.S.A.
Melitæa Artemis—May 14, W.H.C.
Nemeobius Lucina—May 30, W.G.G.S., Rabley
Thecla W-album—July 19, P.H.M.
Quercus—July 13, H.C.B.
Chrysophanus Phleas—May 9, W.F.B.
Polyommatus Alsus—June 30, F.S.A.
Alexis—May 21, W.F.B.
Agestis—May 24, W.F.B.
Thymele Alveolus—May 21, P.H.M.; F.S.A.
Thanaos Tages—May 11, H.D.
Pamphila Linea—July 7, W.F.B.
Sylvanus—May 30, W.G.G.S.
HETEROCEBIA.
SPHINGINA.
Procris Geryon—May 31, W.G.G.S., Rabley
Statice—June 23, F.S.A., Martinell
Anthrocera Lonicæ—June 30, F.S.A., Burney
Filipendulæ—June 30, F.S.A.
Smerinthus Ocellatus—June 25, G.T.K.M.
Populi—May 30, H.V.T.
Tilise—June 2, W.F.B.
Sphinx Ligustri—June 20, A.E.R.M.
Chærocampa Elpenor—June 6, R.J.M.B.
Macroglossa Stellatarum—June 22, A.G.P.
BOMBYCINA.
Hepialus Hectus—June 13, P.H.M.
Lupulinus—May 27, W.F.B.
Humuli—June 12, H.G.G.
Velleda—June 14, F.S.A., Rabley, at dusk.
Stauropus Fagi—Jn. 18, J.A.; Stype
Pterostoma Palpina—June 3, W.G.G.S.
Lophopteryx Camelina—May 16, P.H.M.
Diloba Cæruleocephala—July 27, W.H.C.
Petasia Cassinea—Oct. 25, W.F.B., on oak trunks.
Pygæra Bucephala—(bred) May 5, W.F.B.; (ct.) June 21, E.K.C.
Psilura Monacha—(bred) July 15, W.F.B.; larva on oaks
Dasychira Pudibunda—June 11, W.F.B.
Demas Coryli—(bred) Moh. 31, W.G.G.S.; (ct.) May 19, F.S.A.
Orgyia Antiqua—(male bred) July 10, W.H.C.; (ct.) July 19, P.H.M.; (fem. bred) July 7, W.H.C.; (ct.) Oct. 16, F.S.A.
Stilpnotia Salicis—(bred) July 13, C.B.L.
Porthesia Auriflua—(bred) July 13, P.H.M.; (ct.) July 16, P.H.M.
Lithosia Complanula—July 16, W.F.B.
Cnistis Quadra—(bred) July 18, P.H.M.
Gnophria Rubricollis—(bred) May 23, W.F.B.; (ct.) June 11, P.H.M.
Euthemonia Russula—June 27, P.H.M.
Arotia Caja—July 2nd, W.H.C.
Nemeophila Plantaginis—June 12, F.S.A., W.H.C. (West Woods)
Phragmatobia Fuliginosa—May 8, P.H.M.

- Spilosoma Menthastri* — May 30,
 E.E.D'S.
Lubricepeda—May 25, P.H.M.
Callimorpha Jacobææ — May 23,
 G.T.K.M.
Pœcilocampa Populi—Nov. 19, W.F.B.
Clisiocampa Nenstria — July 19,
 V.A.B.
Odonestis Potatoria—bred male June
 19, G.T.K.M. : bred female
 June 30, T.N.H.S.
Oilix Spinula—May 17, H.B.R.
Platypteryx Lacertinaria—May 10,
 P.H.M.
Drepana Falcatoria — May 12,
 W.F.B.
Unguicula—May 4, H.B.R.
Thyatira Derasa—July 14, C.B.L.
Batis—*July 18.
Cymatophora Duplaris—*June 14.
Flavicornis—Moh. 12—W.F.B.
Bryophila Perla—June 7, W.F.B.
Acronycta Psi—May 10, P.H.M.
Megacephala—(bred) May 7,
 P.H.M.
Ligustri—*July 18.
Rumicis—May 12, G.G.B.
Leucania Conigera—Jy. 19, W.G.G.S.
Turca—July 16, W.G.G.S.
Comma—June 18, P.H.M.
Pallens—*July 18.
Axilia Putris—*June 14.
Xylophasia Rurea—May 30, T.N.H.S.
Lithoxylea—July 11, W.F.B.
Sublustris—*June 14.
Polyodon—June 22, F.S.A.
Hepatica—June 6, W.F.B.
Luperina Testacea—Sep. 17, P.H.M.
Mamestra Anceps—June 22, P.H.M.
Brassicæ—May 23, W.F.B.
Apamea Basilinea—June 1, J.A.
Unanimis—May 23, W.F.B.
Oculea—July 8, H.D.
Miana Strigilis—June 14, P.H.M.
Fasciuncula—*June 14.
Grammesia Trilinea—*June 14.
Caradrina Cubicularis — July 16,
 W.G.G.S.
Rusina Tenebrosa—*June 14.
Agrotis Segetum—*June 14.
Exclamationis—June 3, W.G.G.S.
Corticea?—June 13, W.H.C.
Porphyræa—June 21, C.T.S.
Triphæna Fimbria—July 22, N.M.
Pronuba—June 4, J.D.L.
Noctua Angur—July 18, W.G.G.S.
Plecta—*May 18.
O-nigrum—*June 13.
Triangulum—*July 18.
Brunnea—*July 18.
Festiva—*June 14.
Baja—July 22, N.M.
Rubi—May 29, W.F.B.
Tœniocampa Gothica—Ap. 8, W.F.B.
Instabilis—Moh. 23, W.F.B.
Stabilis—Moh. 19, W.F.B.
Munda—Moh. 17, W.F.B.
Cruda—Ap. 20, N.M.
Anchocelis Pistacina — Nov. 19,
 W.F.B.
Cerastis Vaccinii—Moh. 13, P.H.M.
Scopelosoma Satellitia—Moh. 24,
 W.F.B.
Xanthia Ferruginea—Oct. 9, P.H.M.
Cosmia Trapezina—*July 18.
Affinis—*July 18.
Dianthœcia Carphophaga—June 4,
 T.A.P.
Cucubali—June 6, H.W.
Miselia Oxyacanthæ—Oct. 9, P.H.M.
Agriopis Aprilina—(bub) Sept. 2,
 (ct.) Oct. 25, W.F.B.

Phlogophora Meticulosa—May 17,
W.F.B.

Euplexia Luoipara—June 6, W.F.B.

Aplecta Herbida—June 6, W.F.B.

Nebulosa—June 7th, W.G.G.S.

Hadena Dentina—June 6, W.F.B.

Oleracea—May 26, W.G.G.S.

Thalassina—May 18.

Adusta—May 30, W.G.G.S.

Xylina Rhizolitha—Moh. 13, P.H.M.

Cucullia Umbratica—June 6, W.H.O.

Brephos Parthenias—Moh. 31,
W.F.B. (round birches).

Notha—Ap. 1; W.P.C.

Abrostola Urticae—June 6, P.H.M.

Triplasia—June 5, P.H.M.

Plusia Pulchrina—June 12, E.E.D'S.

Chrysis—June 2, P.H.M.

Gamma—June 1, B.G.U.

Gonoptera Libatrix—Moh. 2,
W.N.V.; Oct. 3rd, W.B.P.

Amphipyra Pyramidea—(bred), Jy.
19, P.H.M.

Mania Typica—May 25, F.B.O.D'C.

Euclidia Mi—May 21, W.F.B.

Glyphica—May 21, W.F.B.

Phytometra Aenea—May 8, P.H.M.
GEOMETRINA.

Ourapteryx Sambucaria—July 14,
E.E.D'S.

Rumia Crataegata—(bred) Moh. 17,
P.H.M.; (ct.) May 12, F.S.A.

Angerona Prunaria—fem., June 23,
P.H.M.; male, July 1,
W.H.O.

Metrocampa Margaritata—July 2,
W.F.B.

Ellopia Fasciaria—July 13, F.S.A.

Eurymene Dolobraria—May 29,
P.H.M.

Selenia Illunaria—May 7, W.F.B.

Lunaria—June 2, P.H.M.

Illustraria—June 11, P.H.M.

Odontopera Bidentata—(bred) Ap.
30, F.S.A.; (ct.) May 24,
G.T.K.M.

Ennomos Tiliaria—(bred) Aug. 18,
W.H.C.

Erosaria—Sept. 30, L.C.W.T.

Angularia—Sept. 17, P.H.M.

Himera Pennaria—(bred) Oct. 8;
(ct.) Oct. 9, P.H.M.

Phigalia Pilosaria—(male) Moh. 1,
W.F.B.; (female) Mch. 24,
P.H.M.

Nyssia Hispidaria—Moh. 17, W.F.B.
(beech trunk)

Betularia—June 18, G.H.

Hemerophila Abruptaria—May 6,
F.S.A.

Cleora Lichenaria—July 3, W.G.G.S.

Boarmia Repandata—July 3, P.H.M.

Rhomboidaria—July 13, F.S.A.

Roboraria—June 25, W.F.B.

(oak trunks.)

Tephrosia Punctulata—May 14, P.H.M.

Crepuscularia—Moh. 24, W.G.G.S.;
W.F.B.

Laricaria—May 7, W.F.B.

Extersaria—June 7, P.H.M.

Geometra Papilionaria—July 14,
P.H.M. (Rabley.)

Iodis Vernaria—July

Laotearia—May 22, P.H.M.

Phorodesma Bajularia—July 7,
W.F.B. (Hens Wood)

Hemithea Thymiararia—July 7, W.F.B.

Ephyra Porata—June 30, P.H.M.

Punctaria—May 14, W.F.B.

Trilinearia—May 5, W.F.B.

Asthena Luteata—June 28, P.H.S.

Candidata—May 18, P.H.M.

- Sylvata*—June 11, W.F.B.
Acidalia Bisetata—July 7, W.F.B.
Trigeminata—July 14, P.H.M.
Virgularia—June 28, W.F.B.
Remutata—May 30, W.G.G.S.
Aversata—July 2, W.F.B.
Bradyepetes Amataria—July 12,
W.F.B.
Cabera Pusaria—May 16, W.F.B.
Exanthemata—May 28, E.P.
Corycia Punctata—May 12, W.F.B.
Taminata—May 21, F.B.C.D'O.
Macaria Liturata—May 28, W.G.G.S.
(Fir Wood).
Strenia Clathrata—May 8, P.H.M.
Lozogramma Petraria—May 12,
W.F.B.
Numeria Pulveraria—May 24, P.H.M.
Fidonia Atomaria—June 12, W.H.O.
Piniaria—June 18, P.H.S. (Fir
Wood).
Minca Euphorbiata—May 31, W.F.B.
Abraxas Grossulariata—July 14,
P.H.M.
Ligdia Adustata—May 14, P.H.M.
Lomaspilis Marginata—May 21,
W.G.G.S.
Hybernia Rupicaprarria—Moh. 12,
W.F.B.
Leucophearia—Feb. 27, W.F.B.
Aurantiarria—Oct. 9, P.H.M.
Progemmaria—Moh. 1, W.F.B.
Defoliaria—Nov. 6, P.H.M.
Anisopteryx Escularia—Moh. 12,
W.F.B.
Cheimatobia Brumata—Nov. 19,
W.F.B.
Oporabia Dilutata—Oct. 11, W.F.B.
Larentia Didymata—June 18, F.S.A.
Multistrigaria—Moh. 24, P.H.M.
Miaria—June 4, W.G.G.S.
- Emmelesia decolorata*—June 18,
P.H.M.
Affinitata—May 28, P.H.M.
Alchemillata—July 9, W.F.B.
Albulata—May 24, P.H.M.;
F.S.A.
Eupithecia Consignata—May 15,
F.S.A.
Succentaureata—June 18, F.S.A.
Subumbrata—July 13, W.F.B.
Castigata—May 5, W.F.B.
Virgaureata—May 24, P.H.M.
Subfulvata—June 2,
Lariciata—June 9, W.G.G.S.
Irriguata—May 5, W.F.B. (on
beech trunks).
Vulgata—May 21, W.G.G.S.
W.F.B.
Assimilata—May 16, W.F.B.
Abbreviata—May 21, P.H.M.
Exiguata—June 11, W.F.B.
Coronata—June 7, P.H.M.
Rectangulata—June 28, F.S.A.
Lobophora Lobulata—May 4, W.F.B.
Thera Variata—June 7, W.G.G.S.
Ypsipetes Elutata—bred July 18,
F.S.A.; Oct. July 13, O.T.S.
Melanthia Rubiginata—July 9,
P.H.M.
Ocellata—June 2, P.H.M.
Albiocillata—June 12, W.F.B.
Melanippe Hastata—June, 11 W.F.B.
Unangulata—July 9, P.H.M.
Rivata—July 19, F.S.A.
Birivata—May 8, W.G.G.S.
Montanata—May 13, P.H.M.
Fluctuata—May 5, F.S.N.
Antiolea Rubidata—July 14, P.H.M.
Derivata—May 7, T.N.H.S.
Coremia Propugnata—May 5, F.S.A.
Ferrugaria—May 4, F.S.A.

- Unidentaria—May 18, W.F.B.
 Camptogramma Bilineata—June 7,
 P.H.M.
 Phibalapteryx Tersata—July 16,
 P.H.M.
 Scotosia Dabitata—ct. Sept. 17,
 P.H.M.; bred July 18,
 F.S.A.
 Vetulata—June 29, P.H.M.
 Rhamnata—July 16, W.G.G.S.
 Eucoemia undulata—June 23, W.F.B.
 Cidaris Miata—Sept. 24, W.F.B.
 Picata—July 1, W.G.G.S.
 Corylata—May 13, P.H.M.
 Russata—May 29, P.H.M.
 Immanata—June 13, P.H.M.
 Suffumata—May 10, W.F.B.
 Silaceata—May 10, P.H.M.
 Testata—Sept. 5, W.H.C.
 Fulvata—June 30, P.H.M.
 Pyralata—July 9, W.F.B.
 Dotata—June 25, G.T.K.M.
 Eubolia Mensuraria—July 13, H.O.C.
 Plumbaria—June 24, F.S.A.
 Anaitis Plagiaria—June 14, F.S.A.
 Odezia Chærophyllata—June 4,
 W.G.G.S.; W.F.B.
 PYRALIDINA.
 Hypena Proboscidalis—May 28,
 W.P.B.
 Rivula Sericealis—July 7, P.H.M.
 Herminia Barbalis—May 24, P.H.M.
 Nemoralis—May 29, P.H.M.
 Pyralis Glaucinalis—July 12, W.H.C.
 Pyrausta Purpuralis—May 21, F.S.A.
 Herbulia Cespitalis—May 7, W.F.B.
 Hydrocampa Nymphæata—July 4,
 F.S.A.
 Botys Pandalis—May 28, W.F.B.
 Fuscalis—June 6, W.G.G.S.
 Urticata—May 26, R.H.M.
 Ebulea Sambucalis—July 10, P.H.M.
 Pionea Forficatalis—May 24, G.T.K.M.
 Scopula Lutealis—June 4, P.H.M.
 Olivalis—June 2, F.S.A.
 Prunalis—June 13, P.H.M.
 Stenopteryx Hybridalis—July 12,
 P.H.M.
 Nola Cristulalis—May 4, F.S.A.
 Simaethis Fabriciana—May 28
 F.S.A.
 Eudorea Ambigualis—May 24, F.S.A.
 Pyralella—June 4, P.H.M.
 Aphomia Colonella—July 18, W.F.B.
 Crambus Pratellus—May 21, P.H.M.
 Hortuellus—June 16, F.S.A.
 Tristellus—July 13, W.F.B.
 Chloephora Prasinana—(bred) Ap.
 10, W.G.G.S.; (ct.) June 6,
 J.A.
 Hypermezia Augustana—July 7,
 W.F.B.
 Eulia Ministrana—May 23, W.G.G.S.
 Antithesia Cynosbatella—July 18,
 W.F.B.
 Pruniana—May 21, P.H.M.
 Tortrix Viridana—June 23, P.H.M.
 Forsterana—July 1, W.F.B.
 Ribeana—June 25, G.T.K.M.
 Lozotaenia Sorbiana—July 8, W.F.B.
 Musculana—May 12, P.H.M.
 Fulvana—July 13, P.H.M.
 Xylosteana—July 7, W.F.B.
 Rosana—July 8, W.F.B.
 Ptycholoma Lecheana—June 12,
 W.F.B.
 Pardia Tripunctana—May 23, P.H.M.
 Spilonota Rosæcolana—July 13,
 W.F.B.
 Trimaculana—July 4, P.H.M.
 Lithographia Campoliliana—May 23,
 P.H.M.

- Poedisca Ophthalmicana*—Sept. 30, W.F.B. (West Woods).
Halonota Bimaculana — Oct. 5, W.F.B.
 Scutulana—May 21, P.H.M.
 Brunnichiana—May 21, F.S.A.
Coccyx Hyrciniana—May 24, P.H.M.
Anchylopera Mitterbacheriana — May 12, P.H.M.
 Lundana—May 18, P.H.M.
Argyrotoza Conwayana— May 28, P.H.M.
Dictyopteryx Contaminana—Oct. 5, W.F.B.
 Loeflingiana—July 3, P.H.M.
Crocisa Bergmanniana — July 13, W.F.B.
 Forskaleana—Sept. 30, W.F.B.
 Holmiana—July 20, P.H.M.
Oxygrapha Literana— May 7, W.F.B.
Peronea Favillaceana — July 20, P.H.M.
 Variegana—July 20, P.H.M.
Teras Caudana—Sept. 30, W.F.B.
Pœcilochroma Corticana—July 9, W.F.B.
Roxana Arcuella—June 7, W.G.G.S.
Ephippiphora Argyrana— May 12, P.H.M.
Stigmonota Perlepidana — May 7, W.F.B.
Grapholita Ulicetana — May 7, P.H.M.
 Hypericana—July 3, P.H.M.
 Nigricans—May 24, W.G.G.S.
Cnephassa Subjectana — June 11, P.H.M.
 Virgaureana—July 13, W.F.B.
Sericoris Lacunana—June 24, W.F.B.
 Urticana—May 28, P.H.M.
Chrosis Tesserana—July 3, P.H.M.
- Argyrolepis Cnicana*—July 9, W.F.B.
Tortricodes Hyemana — March 6, W.G.G.S.
 TINEINA.
Chimabacche Phryganella—Oct. 16, F.S.A.
 Fagella—Mch. 24, P.H.M.
Tinea Cloacella—June 11, W.G.G.S.
 Fulvimitrella—May 22, W.F.B.
Incurvaria Capitella — May 22, W.F.B.
 Mascullella—May 10, P.H.M.
Nemophora Swammerdammella — June 14, F.S.A.
 Schwarzella— June 14, P.H.M.
Adela De Geerella—June 4, P.H.M.
 Viridella—May 24, F.S.A.
 Subpurpurella—May 7, P.H.M.
Swammerdamia Pyrella — May 7, W.F.B.
Hyponomeuta Padellus — July 14, E.E.D'S.
Cerostoma Radiatella — July 13, P.H.M.
 Costella—July 13, P.H.M.
Phibalocera Quercana — July 13, P.H.M.
Depressaria Applana — Jan. 31, W.G.G.S.
 Umbellana—Mch. 27, W.F.B.
Gelechia Rufescens—June 1, W.F.B.
 Terrella—June 12, P.H.M.
 Proximella—June 5, W.G.G.S.
Dasyocera Sulphurella—Jn. 18, P.H.M.
Cecophora Pseudopretella—May 31, W.F.B.
 Endrosis Fenestrella—May 4, P.H.M.
Pancalia Leuwenhoekella— May 30, W.G.G.S.
Glyphipteryx Fuscoviridella — May 23, P.H.M.

Graoilaria Swederella — May 12,
 W.G.G.S.
Syringella—May 7, T.H.M.
Coleophora Siocifolia—May 5, W.F.B.
Albicosta—May 5, W.F.B.
Cæspititiella—May 13, W.F.B.
Laverna Atra—June 13, W.G.G.S.
Chrysocorys Festaliella — May 21,
 W.G.G.S.
Elachista Nigrella — May 21,
 W.G.G.S.
Cygnipennella—May 26, R.W.R.
Lithocolletis Cramerella—May 12,
 W.G.G.S.

Ulmifoliella—May 13, P.H.M.
Faginella—Ap. 25, N.M.
Quercifoliella—May 7, P.H.M.
Cemiostoma Laburnella — May 28,
 F.B.C.D'C.; R.W.R.
 PTEROPHORINA.
Pterophorus Trigonodactylus—June,
 27, E.E.D'S.
Fuscus—June 28, P.H.M.
Pterodactylus—Sept. 17, P.H.M.
Pentadactylus — June 25,
 G.T.K.M.

COLEOPTERA.

Subjoined is a list of 235 recorded notices. This is an improvement on last year, but at least twice this number might be reached by any one member who would devote himself to collecting. There is a goodly list of names, but with the exception of Blandford, who has done some good work, few have exhibited more than a casual interest. It is hoped that next year so fertile a subject may produce some more ambitious votaries, whose aim will go beyond merely seeing their names appended as below.

J A.	...	...	J. Acton.
F.S.A.	...	...	F. S. Alston.
E.B.B.	...	...	E. B. Badcock.
H.C.B.	...	...	H. C. Berwick.
W.F.B.	...	...	W. F. Blandford.
E.K.C.	...	...	E. K. Chambers.
A.G.C.	...	...	A. G. Chichester.
Mr. C.	...	...	Mr. Coleman.
E.E. de S.	...	...	E. E. de Satgé.
F.E.D.H.	...	...	F. E. Drummond-Hay.
A M F.	...	...	A. M. Fairbairn.
C.H.H.	...	...	C. H. Harding.
T.N.H.S.	...	...	T. N. Hart-Smith, Esq.
G.H.	...	...	G. Heaton.
J.C.K.	...	...	J. C. Krüger.

A.L.J.	...	...	A. L. Jackson.
J.L.	...	...	J. Langworthy.
P.H.M.	...	...	P. H. Maddock.
A.W.M.	...	...	A. W. Mahaffy.
N.N.M.	...	...	N. N. Marsh.
G.T.K.M.	...	...	G. T. K. Maurice.
A.P.	...	...	A. Percival.
P.O.P.	...	...	P. C. Phillips.
Miss P.	...	...	Miss Preston.
H.M.P.	...	...	H. M. Prescott.
T.A.P.	...	...	Rev. T. A. Preston.
W.B.P.	...	...	W. B. Price.
B.J.R.	...	...	B. J. Reynolds.
R.W.R.	...	...	R. W. Rickards.
G.L.R.	...	...	G. L. Rolleston.
R.W.R.	...	...	R. W. Rotheram.
C.T.S.	...	...	C. T. Sidgwick.
R.A.W.	...	...	R. A. Waddilove.
J.A.W.	...	...	J. A. Wanklyn.
O.F.W.	...	...	O. F. Waterfield.
H.W.	...	...	H. West.

Notiophilus biguttatus—Feb. 16,
O.F.W.

Elaphrus cupreus—May 14, W.B.P.

Blethisa multipunctata—May 28,
T.N.H.S.

Cychrus rostratus—Feb. 6, W.F.B.

Carabus granulatus—May 20, R.A.W.
catenulatus—June 30, A.G.C.
violaceus—J L, Ap. 1.

Nebria brevicollis—T.N.H.S., Feb. 6.

Leistus ferrugineus—June 18,
F.E.D.H.

Dromius agilis—Feb. 17, W.F.B.

quadrimaculatus—Feb. 17, W.F.B.

quadrinotatus—Mar. 8, W.F.B.

Loricera pilicornis—G.T.K.M., Feb. 6

Chlaenius nigricornis—T.N.H.S., Feb.
6.

Badister bipustulatus—Mar. 22,
P.C.P.

Calathus melanocephalus—Mar. 30,
W.F.B.

Anchomenus dorsalis—F.E.D.H.,
Mar. 4.

parumpunctatus—Feb. 17,
G.T.K.M.

fuliginosus—June 24, T.N.H.S.

Pterostichus niger—June 30, G.E.R.

nigrita—Feb. 6, G.T.K.M.

minor—G.T.K.M., Feb. 6.

strehius—W.F.B., Mar. 10.

oblongo-punctatus—Feb. 6,
G.T.K.M.

madidus—A.L.J., June 3.

striola—J.A., June 20.

Amara familiaris—May 8, F.E.D.H.

- acuminata*—Mar. 16, C.T.S.
trivialis—May 8, J.A.W.
ovata—June 24, F.S.A.
Harpalus rufiabris—Sep. 29, W.F.B.
rufo-cornis—June 12, E.E.de S.
Patrobis excoavatus—Feb. 24, W.F.B.
Trechus minutus—W.F.B., Mar. 10.
obtusus—F.E.D.H., Mar. 23.
Bembidium obtusum—Mar. 4,
F.E.D.H.
quadrinaculatum—W.F.B., Mar.
30.
quadriguttatum—Mar. 25,
T.N.H.S.
lucidosus—Mar. 30, W.F.B.
brunnipes—May 11, W.F.B.
Haliplus fulvus—Mar. 12, W.H.R.
rufo-collis—May 30, R.A.W.
Hydroporus depressus—May 30, R.A.W.
littoralis—Mar. 30, W.F.B.
plumbeus—J.A., Feb. 6.
Colymbetes fuscus—Sep. 25, W.F.B.
pulverosus—May 30, G.T.K.M.
Ilybius fuliginosus—Sep. 22, W.F.B.
Agabus bipustulatus—J.A., Feb. 6.
uliginosus—May 28, W.H.R.
nebulosus—W.F.B., Mar. 14.
maculatus—May 30, R.A.W.
Dytiscus marginalis—W.F.B., Mar. 14.
Gyrinus natator—Mar. 14, W.F.B.
Hydrobius fuscipes—Mar. 30, G.T.K.M.
Belochares lividus—W.F.B., Mar. 24.
Anacæna variabilis—May 30, R.A.W.
Helophorus aquaticus—Mar. 24,
W.F.B.
griseus—May 30, R.A.W.
granularis—Mar. 24, W.F.B.
Sphæridium scarabæoides—May 24,
W.F.B.
Cercyon flavipes—Mar. 20, W.F.B.
lateralis—Feb. 17, W.F.B.
Megasternum bolstophegum—Feb. 17,
W.F.B.
Cryptopleurum atomarium—May 5,
W.F.B.
Leptusa ruficollis—Feb. 6, W.F.B.
Aleochara fuscipes—June 12, C.T.S.
Homalota luridipennis—July 1,
T.N.H.S.
fungi—Feb. 17, T.N.H.S.
Tachyporus obtusus—Feb. 17, W.F.B.
chrysomelinus—Feb. 17, W.F.B.
hypnorum—Feb. 17, W.F.B.
pusillus—T.N.H.S., Feb. 15.
brunneus—W.F.B., Feb. 17.
Tachinus rufipes—Feb. 17, W.F.B.
laticollis—C.H.H., Mar. 22.
marginellus—W.F.B., Mar. 30.
Bolitobius pygmaeus—July 1, T.N.H.S.
Quedius molochinus—Feb. 17, W.F.B.
fuliginosus—Feb. 24, W.F.B.
Creophilus maxillosus—May 30,
R.A.W.
Leistotrophus nebulosus—May 11,
W.B.P.
Ocypus cupreus—May 8, W.B.P.
morio—Sep. 29, W.F.B.
Philonthus splendens—Feb. 24, W.F.B.
laminatus—G.T.K.M., Feb. 6.
decorus—Feb. 6, W.F.B.
politus—Feb. 24, W.F.B.
varius—Feb. 24, W.F.B.
finetarius—May 4, F.E.D.H.
Xantholinus linearis—W.F.B., Feb.
24.
Othius fulvipennis—W.F.B., Feb. 24.
Lathrobium brunnipes—Feb. 24,
W.F.B.
elongatum—Feb. 6, W.F.B.
multipunctum—Mar. 24, W.F.B.
Stilicis orbiculatus—W.F.B., Feb. 24.
Stenus Juno—Feb. 6, T.N.H.S.

- speculator*—Feb. 24, W.F.B.
unicolor—Mar. 24, W.F.B.; Feb. 17, W.F.B.
impressus—Feb. 17, T.N.H.S.
tarsalis—G.T.K.M., Jan 31.
Oxytelus rugosus—Feb. 17, W.F.B.
Lesteva longælitrata—W.H.R., May 28
Homalium rivulare—Mar. 24, W.F.B.
Bryaxis fossulata—W.F.B., Mar. 10
Choleva angustata—May 5, W.F.B.
agilis—Ap. 3, R.A.W.
nigricans—Mar. 24, W.F.B.
tristis—Mar 24, W.F.B.
Necrophorus humator—June 18, W.F.B.
mortuorum—W.F.B., May 5.
vespillo—Sept. 18, G.T.K.M.
Silpha littoralis—Feb 12, G.T.K.M.
rugosa—May 18, T.N.H.S.
quadripunctata—P.H.M., June 7
atrata—G.T.K.M., Feb 6.
Hister cadaverinus—June 3, R.W.R.
Epuræa æstiva—June 4, T.N.H.S.
deleta—July 1, T.N.H.S.
florea—May 28, T.N.H.S.
Soronia grisea—T.A.P., May 14
Meligethes rufipes—June 18, A.M.F.
senens—W.H.R., Mar. 12.
Byturus tomentosus—May 31, T.N.H.S.
Rhizophagus bipustulatus—P.H.M., Mar. 6.
Lathridius minutus—Mar. 24, W.F.B.
Corticaria elongata—Feb. 17, W.F.B.
Dermestes murinus—Feb. 17, W.F.B.
Byrrhus pilula—G.T.K.M., Feb. 6.
Cytilus varius—Ap. 1, R.A.W.
Sinodendron cylindricum—May 11, W.F.B.
Aphodius subterraneus—June 6, W.H.R.
fossor—May 16, N.N.M.
finetarius—May 30, R.A.W.
inquinatus—Mar. 23, P.C.P.
prodromus—May 30, R.A.W.
depressus—May 4, W.F.B.
Geotrupes Typhæus—E.K.C., Mar. 7.
stercorarius—May 11, W.F.B.
syloaticus—May 11, W.F.B.
Melolontha vulgaris—May 24, W.H.R.
Phyllopertha horticola—June 18, J.A.
Laeon murinus—A.P., June 12.
Melanotus rufipes—May 29, E.E. de S.
Athous hæmorrhoidalis—May 28, E.E. de S.
vittatus—June 18, T.N.H.S.
Corymbites pectinicornis—July 1, A.G.C.
sobrinus—W.F.B., May 4.
pallidulus—May 31, T.N.H.S.
Campylus linearis—J.A., June 18.
Dascillus cervinus—June 20, P.H.M.
Lampyris noctiluca (male), June 14, T.N.H.S.; (female), July 10, B.J.R.
Telphorus fuscus—May 28, W.F.B.
lividus—June 24, F.S.A.
pellucidus—May 31, T.N.H.S.
nigricans—June 7, W.F.B.
bicolor—May 31, T.N.H.S.
limbatus—May 28, T.N.H.S.
pallidus—June 7, W.F.B.
Malachius bipustulatus—June 18, A.M.F.
Octotemnus glabriculus—June 5, W.F.B.
Blaps mortisaga—May 2, G.T.K.M.
Rhinosimus ruficollis—Feb 6, W.F.B.
planirostris—Feb. 17, W.F.B.
Melandrya caraboides—June 5, W.F.B.
Pyrochroa serraticornis—May 21, E.E. de S.

- Anaspis frontalis*—June 4, T.N.H.S.
rufoicollis—May 31, T.N.H.S.
melanopa—May 31, T.N.H.S.
Meloe proscarabæus—A.W.M., Mar. 27.
Oedemera lurida—June 5, W.F.B.
Otiorhynchus tenebriocosus—Ap. 29, Miss P.
picipes—June 28, F.E.D.H.
sulortus—June 24, R.A.W.
Phyllobius a'neti—May 29, E.E.deS.
pyri—June 18, A.M.F.
argentatus—May 9, W.B.B.
oblongus—June 12, A.P.
uniformis—June 18, A.L.J.
viridicollis—May 30, R.A.W.
Liophlaeus nubilus—June 18, T.N.H.S.
Strophosomus coryli—Mar. 8, W.F.B.
Sitones suturalis—June 24, T.N.H.S.
puncticollis—May 28, E.E. de S.
lineatus—May 8, F.E.D.H.
Hypera punctata—May 30, P.H.M.
rumicis—Feb. 17, W.F.B.
variabilis—Mar. 30, W.F.B.
Mecinus pyraister—Mar. 30, W.F.B.
Balaninus brassicæ—June 14, A.L.J.
Anthonomus pedicularius—W.F.B., Mar. 24.
Orchestes quercus—Feb. 6, T.N.H.S.
alni—P.H.M., May 28.
fagi—W.H.R., Mar. 12.
Cœliodes quadrimaculatus—May 4, W.F.B.
geranii—June 18, A.L.J.
Ceuthorrhynchus contractus—May 4, W.F.B.
hirtellus—Feb. 6, W.F.B.
Apion carduorum—Feb. 17, W.F.B.
fagi—May 4, W.F.B.
æthiops—Mar. 30, W.F.B.
violaceum—May 28, W.H.R.
Rhynchites betulæ—June 18, A.M.F.
Apoderus coryli—June 18, A.M.F.
Callidium violaceum—June 22, F.S.A.
Olytus arietis—June 2, W.F.B.
Liopus nebulosus—May 27, C.T.S.
Toxotus meridianus—June 14, F.S.A.
Strangalia armata—Mr. O, Aug ?
melanura—June 30, E.E. de S.
Donacia sericea—June 12, R.A.W.
Lema cyanella—Jan. 31, E.B.B.
Clythra quadripunctata—May 29, P.H.M.
Cryptocephalus aureolus—June 4, R.A.W.
Timarcha lævigata—Mar. 12, G.T.K.M.
coarctata—Mar. 10, H.C.B.
Chrysomela staphylæ—Feb. 26, H.W.
fastuosa—May 26, E.E. de S.
polita—Feb. 15, W.F.B.
Prasocuris marginella—May 31, T.N.H.S.
phellandrii—May 30, R.A.W.
Adimonia tanacetii—Sept. 20, W.F.B.
Crepidodera ferruginea—June 18, F.E.D.H.
Podagrica fascicornis—May 26, C.T.S.
Aphthona venustula—May 4, W.F.B.
Phyllotreta undulata—Feb. 17, W.F.B.
Plectroscelis concinna—Feb. 6, W.F.B.
Thyamis lurida—May 31, T.N.H.S.
Cassida viridis—May 29, E.E. de S.
Coccinella bipunctata—Feb. 10, G.T.K.M.
variabilis—J.C.K., Feb. 26.
18-guttata—H.M.P., Feb. 17.
14-guttata—G.H., July 16.
16-guttata—P.H.M., May 6.
14-punctata—R.A.W. Ap. 1.

THE ASTRONOMICAL SECTION.

This youngest off-shoot of the Natural History Society has enjoyed only a brief period of existence; it reckons its life by months only, and not by years; but the sapling shows signs of a vigorous vitality which will surely cause it to develop into a flourishing tree. For the benefit of the antiquary of the future, to whom it will be a matter of deep interest to trace the origin and growth of this institution, we here record the work of its first term of life, hoping thereby to refute the calumnies of detractors (from the classical side) who hold that a telescope is but a pretty, though expensive, scientific toy.

The work of the section has been of two kinds, practical and theoretical; telescopic observations when weather and disciplinary rigour permitted, and lectures on the elements of astronomical science. Observations on the Moon on Jupiter, and his satellites, on Saturn, Mars, Venus and Mercury (seen in close proximity one frosty morning early in December), the resolution of star-clusters, examination of nebulae such as those in Andromeda, Lyra, Orion, Taurus, and many others, inspection and measurement of Sun-spots on almost every fine day,—such, in brief record, have been the labours of the devotees of the section, who occupied such moments as remained in testing the powers of the telescope in resolving double stars, and in comparing the spectra of brilliant stars like Vega, Rigel, Capella, Sirius, and the great nebula in Orion.

This work, said the mockers, was mere star-gazing; and without attempting to argue with them, the section set itself to the more arduous labour of mastering some of the elements of the science. Copies of *Lookyer's* Primer were first distributed; then H. L. Callendar undertook to supplement the elementary knowledge contained therein by periodical lectures. Beginning with the earth and the mode in which measurements on the surface of the earth itself are made the basis of all measurements, and passing thence to the heavenly bodies, the lecturer explained the manner in which the parallax of the Moon may be obtained. The various astronomical systems were historically discussed, and it was shown how the Ptolemaic theory gave way to the Copernican; how the elliptical form of planet's orbits was empirically ascertained by Kepler and established deductively upon a

scientifically true basis by Newton's theory of gravitation ; how observations on Mars led to a rough calculation of the sun's distance, subsequently corrected by Halley's method, founded upon observations during transits of Venus ; how observations on the times of the eclipsing of Jupiter's satellites led to the first computation of the velocity of light ; and how the experimental determination of this velocity in turn afforded a more accurate determination of the sun's distance,—with many other things which could only be recorded in a full report. The members of the section had at the same time the opportunity afforded them of attending a course of lectures by Mr. Rodwell on the spectroscope, illustrated with experiments. We may close this short story of the work of the section during its first term's life by expressing a hope that its future may be not unworthy of its early promise.

DONATIONS.

GEOLOGICAL.

Specimen of Coral	G. A. H. C. Berkeley.
Alabaster from Gloucestershire	H. P. Mullins.
Characteristic Fossils from Upper Devonian rocks, from near Tiverton	Rev. C. S. Bere.
Large Shell from flint, from field near station ...	G. C. F. A. S. Finden.
Shark's Tooth and Belemnite	E. M. Farrar.
Fossils from Cheddar Cliffs	L. E. Upcott, Esq.,
Belemnite and Shell from near Oxford	W. A. King Harman.
Specimens of Talc, &c., from Bitter Lake	H. C. Berwick.
Very large specimen of Coral	"
Portions of Stalactites from Limestone Caverns of Adelsberg	"
Mountain Limestone from Coal Measures	A. J. C. Ross.
Collection of Fossils from coprolite beds of Little Oakley, Harwich	Rev. G. Burmester.
Collection (a) from same bed	W. Colchester, Esq.
" (b) from Calcaire Grossière, Paris	"
" (c) from chalk of Norwich	"

ZOOLOGICAL, &c.

Hippocampus from Nice	H. E. Clark
Snake's Skin	E. M. Farrar.
Five examples of Nest of Trap-door Spider, from South France	W. T. Grenfell.

ORNITHOLOGICAL.

Skin of young Ostrich	Mrs. Congreve.
Two Ostrich Eggs from South Africa	Miss Mullins.
Dabchick choked by a Stickleback	Dr. Maurice.
Three Eggs of Stormy Petrel (one broken)	P. C. Atkins, Esq., O.M.
One Ostrich Egg	H. C. Berwick.
Easter Egg, about twenty years old	G. T. K. Maurice.
Ring Ouzel	G. H. Dawson, Esq., O.M.
Six Skins of American birds	Mr. B. P. Nicholls.

NUMISMATIC.

- Half Gulden, 1848, Will. ii., King of Netherlands... G. A. H. C. Berkeley.
 Five Cent (1879), Alph. xii., King of Spain.
 Ten Pennia (1865)
 Five Pennia (1866), one Turkish E. A. Molony.
 Two and half silber Groschen, Prussia (1872) .. J. S. Wilson.
 Medal commemorative of Exhibition of 1862 ... L. J. Rendel.
 About two hundred Coins and Tokens, mostly English, including spade guinea, half-guinea (1788), guinea (1777), and some Roman copper coins found near Tetbury... .. A. H. Paul, Esq., O.M.
 Original Indian Rupee L. C. W. Ogbourne.
 Coin found under new shed at bathing place... .. Rev. J. S. Thomas.
 Three half-penny piece (1834) H. C. B. Foyster.
 Eleven Coins, Indian and Turkish, found by donor in clearing out Treasury of the State of Akat-kot C.E.G. Crawford, Esq., O.M.
 Half Anna (1836), E.I.C H. C. Buoknall.
 One Coin, old German (?) E. E. De Satgé.
 Roman Coin from Bayeux Cathedral L. J. Rendel.
 Five Portuguese Coins W.H.G. Worship, Esq., O.M.
 Twelve Coin-trays E. M. Farrar.

ETHNOLOGICAL.

- New Testament in Chinese A. S. Grove.
 Knife and Sheath Dr. Fergus.
 Japanese Moth-cage F. Meyrick Jones.
 Zulu Knob-kerry and an Assegai, from near spot where Prince Imperial fell R. F. Giveen
 Chinese Newspaper G. F. Rodwell, Esq.
 Carved Stone from Bhuddist Shrine, near Gaya in Behar, and Brick from one of the Topes at Sárnâth, Benares C.E.G. Crawford, Esq., O.M.
 The Ceylon collection:—A Kandian Chief's Hat, one very old Sami, or figure of Bhudda, in ivory, one ditto in brass, one ditto in bronze, model of a catamaran, bronze lamp, three specimens of pottery, horse-keeper's fly-brush, two hand-whips, ancient spear-head, five coloured canes, three devil dancers' marks, two coloured mats, two copies of native Holy writings H. C. Berwick.

A double Key from Manton	...	...	...	...	L. J. Bendel.
Flint Pistol, by H. Knoek...	...	...	...	...	J. B. Nugent Bankes.
Pack of Spanish Cards	...	...	...	...	H. Richardson, Esq.
Specimen of Roman Pavement from Caerleon,					
Monmouth	...	...	...	...	B. Rickards, Esq.

BOTANICAL.

Collection of pressed sea-weeds	...	...	...	G. T. K. Maurice.
First specimen of rare lichen ever found in				
England	...	...	...	A. H. Lister.
Large pod from Ceylon and two skeleton branches				
of Euphorbia tree	...	...	...	H. C. Berwick.

LIBRARY.

Notes on Jordan's Mammals of India	... ..	V. E. Barrow.
Manual of Injurious Insects, by Miss Ormerod	...	Rev. T. A. Preston,
Five large photographs of Giant's Causeway	...	"
Two hundred Stamps (various)	... ..	F. W. Yeates.
My Scrap-book,—rough notes on Indian ornithology		H. C. Spry, Esq., O M.
Manual of Geology—Jukes Browne	... ..	Rev. G. Burmester.
Geology, by H. A. Green	... ..	"
Physical Geology of Great Britain, by A. C. Ramsay		"

MISCELLANEOUS.

Large Telescope, with stand and fittings complete	Anonymous.
A Micrometer	H L. Callendar.
Magic Lantern, with sheet, &c., complete	Rev G W De Lisle.
A Jablochhoff candle	A A. G. Palgrave
Forty-eight boxes of dyes	H.R.Armstrong, Esq., O.M.
Air Pump, bequeathed by	J.S.Water, Esq., O.M., M D.

PUBLICATIONS ISSUED BY THE SOCIETY.

	<i>s.</i>	<i>d.</i>
The Antiquities of Marlborough College, a Lecture delivered by Bishop Cotton, 1855	0	6
A Catalogue of the Museum collections, by the Rev. T. A. Preston and F. E. Hulme, Esq.—1880... ..	1	6
A Map of the District, facsimile of Ordnance Survey—1 inch to mile	0	6
Measurement Card	0	6

PUBLICATIONS TAKEN IN BY THE SOCIETY.

Land and Water.
 The Zoologist.
 The Geological Magazine.
 Nature.
 Science Gossip.
 Wiltshire Archæological Magazine.
 The Entomologist.
 Quarterly Journal of Meteorological Society.
 Entomologist's Monthly Magazine.

SOCIETIES WITH WHOM REPORTS ARE EXCHANGED.

Clifton College Scientific Society.
 Watford Natural History Society.
 Bristol Natural History Society.
 Rugby Natural History Society.
 New Zealand Institute
 North American Land Survey.
 Dulwich College Science Society.
 Winchester College Natural History Society.
 North Staffordshire Field Club and Natural History Society.
 Smithsonian Institution
 Anthropometrical Society.

STANTON PRIZES.

i.—Geology.

A collection of Marlborough, Pewsey, and Swindon Fossils.
Jukes' School Manual of Geology.

ii.—Botany.

A collection of Wild Flowers for each month in the year.

A typical specimen will be required for the first specimen seen ; small pieces sufficient for determining the species, afterwards. All specimens to be fastened down with the dates and localities given : and those taken in the holidays to be carefully distinguished. Each Monthly Series to be shewn up when ready. In June and July only first specimens will be required.

iii.—Entomology.

A collection of Moths and Butterflies for each month in the year.

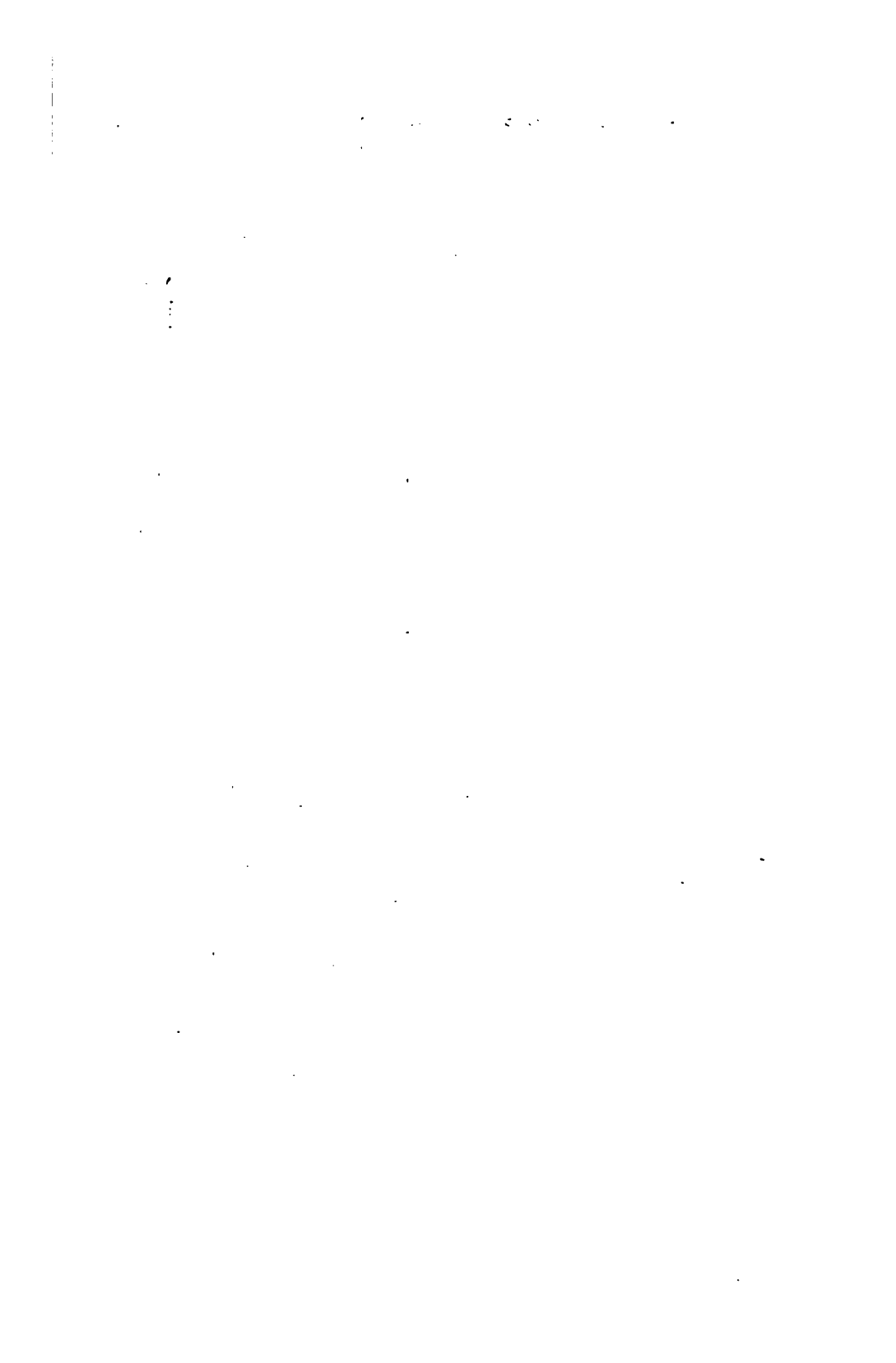
For the first months up to end of May a pair of each species taken,—single specimens afterwards. Each specimen must be numbered with date, locality, &c., of capture, recorded in an accompanying Note Book. Each Monthly Series to be shewn up when ready.

BALANCE SHEET FOR 1881.

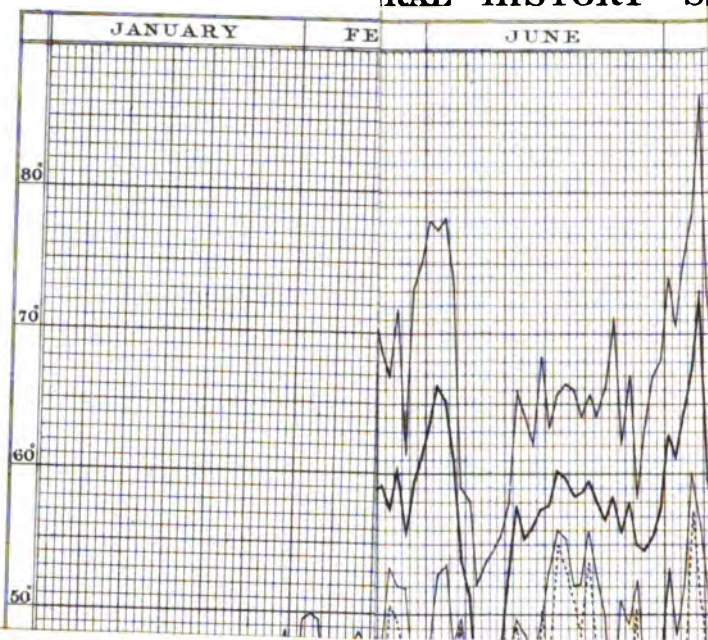
RECEIPTS.		EXPENSES.	
	£ s. d.		£ s. d.
Balance from 1880		Subscription to Wilts Archaeological Society	0 10 6
Subscriptions		Report 1881	... ..
Sale of Reports		Lithographing for Report, 1883	... ..
" Maps		Field Days	... ..
" Almanacs		Paper, Binding, Stationery	... ..
" Weighing Cards		Printing	... ..
" Flower Lists		Cabinet Work	... ..
" Botanical Paper		Preserving Specimens	... ..
" Catalogues		Expenses of Telescope, Microscope, &c.	... ..
" Antiquities		Parcels and Postage	... ..
" XI Lists		Balance	... ..
" Land and Water			
For Field Days			
" Lessons in Bird-stuffing			
School Tax			
	£170 5 1		£170 5 1

N.B.—From the Balance of £57 15s. 5d. must be deducted over £50, being the cost of the 1882 Report, which will have to be paid this term.

J. P. WAY,
Hon. Treasurer.



RAL HISTORY S



Year	Percentage
1950	7.0
1955	8.0
1960	9.0
1965	10.0
1970	11.0
1975	11.5
1980	12.0

Date.	Mean Readg of Baromtr. reduced to Sea Level.	Temperature						Wind.			Mean amt of Cloud (0-10)	Rain.
		In the Shade.						Direction.		Velocity Miles.		
		High-est.	Low-est	Adop-ted. Mean	Dew Point	Highest insun on rays	Lowest on the grass.	A.M.	P.M.			
1	ins. 30.391	42.1	29.6	36.8	36.7	67.7	23.4	W.	W.	108.7	10	in.
2	.488	44.9	39.8	41.6	39.3	48.9	37.7	N.	—	37.8	10	
3	.373	42.2	37.5	39.5	37.4	43.1	34.7	E.S.E.	—	52.8	10	
4	.300	40.5	37.3	38.9	36.4	45.0	33.8	N.E.	N.E.	116.5	9	.02
5	.304	41.1	36.3	38.3	34.2	58.0	31.4	N.E.	E.	298.6	9	
6	.466	39.8	34.0	35.7	29.4	74.8	29.0	N.E.	E.	436.0	4	
7	.612	38.8	29.2	32.2	28.2	76.8	21.1	E.	N.	189.6	0	
8	.561	32.9	26.9	29.3	26.1	36.9	22.6	E.	N.	150.0	10	
9	.386	34.1	29.3	32.0	30.6	51.9	26.4	N.	N.	78.6	10	
10	30.062	32.9	30.3	31.3	30.2	42.9	27.3	N.	N.	83.0	10	
11	29.785	35.8	29.2	31.2	28.7	54.0	26.8	N.	N.	132.5	10	.10
12	.572	32.4	19.7	23.9	16.4	71.3	13.2	N.	W.	77.4	3	
13	.679	31.7	11.5	23.5	23.8	59.0	8.8	N.	N.	123.4	5	
14	.885	27.3	12.2	16.5	13.4	68.0	6.5	N.	N.	27.6	0	
15	.820	30.0	6.9	16.9	12.9	70.7	5.0	N.	W.	54.5	4	
16	.887	32.2	8.5	14.5	5.6	72.7	9.3	W.	—	53.6	5	
17	.701	29.0	8.8	19.6	17.2	42.5	4.3	E.	E.	132.5	8	
18	.136	30.0	24.2	26.5	24.0	38.0	12.3	E.	E.	501.1	10	
19	.370	28.8	22.2	24.3	20.6	37.0	26.2	E.	E.	545.0	10	1.67
20	29.944	30.8	11.7	18.7	13.2	72.5	5.2	W.	—	125.0	5	
21	30.267	25.0	15.9	19.2	16.8	73.1	9.5	E.	E.	116.0	1	
22	.254	27.8	12.6	20.1	17.8	70.4	3.4	N.	—	81.1	10	
23	.273	35.5	23.7	28.9	26.0	63.2	24.9	N.	—	71.0	9	
24	30.264	26.8	11.7	19.5	19.8	32.8	7.4	E.	E.	36.3	9	
25	29.996	25.0	16.5	19.3	18.0	34.7	13.7	N.E.	N.	112.6	9	
26	.551	33.4	17.4	25.8	24.7	48.5	16.3	E.	—	164.3	10	.16
27	.239	39.9	30.2	36.1	37.0	54.0	31.9	—	S	101.1	10	.11
28	29.123	40.0	34.6	37.3	37.2	55.0	33.4	N.	W. ?	87.9	10	.13
29	28.954	45.5	39.1	41.7	40.7	50.0	36.4	S.	—	200.3	10	.40
30	29.187	45.5	38.1	40.5	38.3	54.0	34.9	S.	—	112.3	9	.08
31	29.579	44.8	34.0	39.4	36.6	90.0	26.5	S.W.	—	152.8	5	.01
Mns.	29.913	35.2	24.5	29.0	26.4	56.7	20.7	...	...	1554.9	7.6	2.68
										Sum		Sum

MARCH, 1881.

Date.	Mean Readg. of Barometr. reduced to Sea Level.	Temperature.						Wind.			Mean amt. of Cloud (0-10).	Rain.
		In the Shade.				Highest insun's rays.	Lowest. on the gra.s.	Direction.		Velocity. Miles.		
		High- est.	Low- est.	Adop- ted Mean.	Dew Point			A.M.	P.M.			
1	ins.	43.5	22.3	31.9	22.2	98.3	18.7	W.	W.	167.1	0	in.
2	30.274	44.8	27.5	35.2	28.2	89.9	18.5	W.	E.	122.2	9	
3	29.905	38.4	34.1	36.5	28.5	53.1	31.1	E.S.E.	E.	356.7	10	.25
4	.446	48.8	35.3	42.7	42.8	54.9	33.0	E.	E.	236.2	10	.61
5	.804	56.9	44.9	50.1	48.4	90.3	44.0	S.W.	S.W.	267.5	10	.63
6	.429	54.7	45.2	50.0	46.6	96.4	42.3	W.	W.	269.3	8	.25
7	.344	52.5	45.0	48.3	44.6	71.4	42.1	S.W.	S.W.	334.7	9	.44
8	.827	43.8	39.4	42.9	37.3	102.3	34.0	W.S.W	S.W.	459.6	2	.11
9	29.972	51.2	39.0	46.4	45.5	76.0	34.0	W.	W.	579.0	10	.02
10	30.123	51.7	46.7	48.3	46.7	72.4	46.2	W.	W.	428.8	10	.01
11	.092	57.3	43.3	47.6	41.8	103.7	39.5	W.	W.	319.5	9	
12	30.013	53.1	35.5	43.1	40.7	84.9	31.1	W.	E.	62.7	5	
13	29.890	48.7	40.1	43.8	39.4	60.2	37.6	E.	E.	190.0	10	.06
14	29.986	52.7	39.2	44.0	37.8	96.9	34.9	E.	N.E.	52.1	5	
15	30.294	49.9	32.3	39.2	35.3	98.6	24.7	N.E.	—	186.9	5	
16	.429	61.0	31.1	44.1	38.2	100.7	24.4	E.N.E.	N.	33.1	4	
17	.543	60.0	34.0	44.7	38.9	103.7	27.7	N.N.W	N.	42.6	1	
18	.488	54.8	35.7	44.9	41.6	105.3	26.8	W.	W.	198.1	10	
19	30.207	53.7	40.0	44.5	38.2	110.5	30.8	W.	W.	560.9	5	
20	29.863	51.9	38.1	45.2	41.9	106.9	30.2	W.	N.	194.1	9	.04
21	29.769	47.8	31.1	38.5	30.4	104.9	24.2	W.	W.	263.8	8	.01
22	30.024	46.6	27.4	34.8	28.6	104.0	19.7	W.	W.	204.2	5	.02
23	29.677	44.9	28.3	37.7	37.1	64.1	21.9	S.	S.W.	241.2	10	.26
24	.408	51.0	39.3	43.9	36.2	110.0	35.8	N.W.	S.W.	364.4	9	.33
25	.563	45.4	30.3	36.1	26.4	104.9	25.6	W.	W.	360.0	2	
26	.837	44.6	27.3	35.6	27.1	102.5	21.7	W.N.W	N.	232.4	0	
27	.946	45.2	24.5	34.5	27.2	97.7	17.6	E.S.E.	E.	79.9	0	
28	.888	47.8	26.3	36.6	27.9	101.7	20.1	E.N.E.	E.	138.0	1	
29	29.841	53.9	24.7	37.4	28.4	100.0	20.8	E.N.E.	E.	170.1	5	
30	30.052	46.5	25.3	35.5	25.7	110.1	22.3	E	E.	233.1	0	
31	29.966	47.8	26.6	36.9	26.9	99.7	19.7	E.	E.	268.8	1	
Mns.	29.920	50.2	34.2	41.3	35.7	92.8	29.1	...	...	7687.0 Sum	5.7	2.77 Sum

APRIL, 1881.

Date.	Mean Readg. of Baromtr. reduced to Sea Level	Temperature.						Wind.			Mean amt. of Cloud (0-10)	Rain.
		In the Shade.				Highest in sun's rays.	Lowest on the grass.	Direction.		V- elocity. Miles.		
		High est.	Lowest	Adop- ted Mean	Dew Point			A.M.	P.M.			
1	ins. 29.782	54.0	29.4	40.2	31.1	107.7	25.4	E.N.E.	E.	406.5	3	in.
2	29.905	49.7	34.4	39.8	29.1	108.7	29.7	E.	E.	543.6	1	
3	30.039	45.8	28.4	35.5	20.9	103.7	26.0	E.	E.	504.8	0	
4	29.969	49.6	27.3	37.5	24.3	106.2	24.0	E.	E.	422.6	1	
5	.795	50.8	30.6	38.5	27.0	110.1	26.1	E.	E.	375.1	2	.01
6	29.850	50.6	32.3	40.0	28.4	99.4	29.8	E.	E.	405.3	7	
7	30.046	51.8	29.5	38.8	29.5	114.7	25.9	E.	E.	446.0	7	
8	.092	54.3	28.4	40.6	32.0	110.7	22.8	E.	E.	253.0	8	
9	30.087	54.4	36.1	43.4	35.2	116.2	32.2	E.	E.	166.8	5	
10	29.948	58.1	30.0	46.5	38.3	104.5	22.7	E.	E.	141.3	7	.09
11	.844	56.7	41.4	48.1	45.7	102.1	40.0	S.E.	S.	174.0	10	.32
12	.901	57.1	46.2	51.0	48.1	87.8	42.9	S.W.	E.	164.9	7	
13	.876	62.9	45.3	53.6	45.5	118.9	42.1	S.E.	E.	182.0	7	.01
14	.841	56.9	46.5	50.1	46.3	96.7	39.7	S.	W.	127.0	7	
15	.953	58.1	42.7	47.9	41.9	112.7	34.3	W.	W.	64.9	5	
16	29.999	59.9	35.0	48.4	43.7	103.9	29.0	N.W.	S.E.	83.7	6	
17	30.004	62.1	39.2	50.4	43.8	115.7	28.7	E.	E.	175.4	3	
18	29.979	58.9	37.4	46.3	35.4	114.4	34.7	N.E.	E.	349.0	5	
19	30.026	39.7	36.1	37.5	27.6	63.8	31.2	N.E.	N.E.	388.2	9	
20	29.890	42.3	33.4	37.0	28.9	78.4	32.7	N.E.	N.E.	188.9	10	
21	.823	46.3	26.2	36.8	29.2	101.7	17.6	N.	N.	120.9	9	
22	29.884	51.1	33.7	41.7	31.0	110.7	28.2	N.E.	N.E.	99.0	6	
23	30.041	56.9	28.9	44.0	38.2	114.9	22.1	N.W.	W.	164.0	5	.06
24	30.063	57.9	39.5	48.0	41.4	117.7	31.0	N.	N.W.	263.6	7	.01
25	29.963	57.1	45.5	49.7	44.7	102.5	42.7	W.	W.	294.4	10	.06
26	30.056	54.1	36.1	45.8	39.8	110.2	28.5	N.W.	N.W.	284.0	5	.20
27	.164	53.3	37.5	45.8	40.8	93.8	29.9	W.	W.	105.0	10	
28	.261	61.8	42.8	51.9	42.1	118.7	39.3	N.E.	W.	85.6	5	
29	30.125	60.3	49.0	52.3	46.6	99.7	46.8	W.	W.	193.6	10	.02
30	29.770	58.9	44.6	50.7	43.4	109.6	40.0	S.W.	W.	241.0	2	.09
Mns.	29.966	54.4	36.4	44.6	36.7	105.2	31.5	...	...	7414.1 Sum	6.0	0.87 Sum

MAY, 1881.

Date.	Mean Readg of Barometr. reduced to Sea Level.	Temperature						Wind.			Mean amt. of Cloud (0-10)	Rain. in.
		In the Shade.				Lowest on the grass.	Direction.		Velocity Miles.			
		High- est.	Low- est.	Adop- ted. Mean	Dew Point.		A.M.	P.M.				
1	ins. 29.675	53.0	40.1	47.7	43.8	108.2	32.8	E.W.	S.W. ?	175.4	7	in. .25
2	29.699	55.8	44.4	49.8	43.9	103.9	42.0	E.N.E.	N.E.	156.8	7	
3	30.050	52.1	40.4	44.7	33.8	116.8	28.6	N.E.	—	127.3	2	
4	.081	57.8	35.0	46.2	42.8	107.7	24.7	S.S.W.	W. ?	209.7	5	.08
5	.217	60.2	40.9	51.8	41.3	119.6	34.8	W.	—	211.5	1	
6	.357	63.2	47.9	53.9	47.0	109.6	39.0	W.S.W.	W. ?	289.1	6	
7	.627	66.1	44.7	55.2	43.4	119.9	37.0	N.	— ?	124.7	0	
8	.643	65.4	40.2	53.6	40.4	119.8	29.7	N.E.	E.	122.2	0	
9	.635	59.8	35.9	48.2	36.9	119.1	28.7	E.N.E.	E.	116.9	5	
10	.677	51.5	34.9	42.4	33.1	104.6	25.9	N.E.	N.E.	212.9	5	
11	.592	61.4	28.1	46.4	38.5	116.9	17.8	N.E.	—	75.7	0	
12	.398	67.4	38.0	54.2	40.7	116.5	26.8	E.	—	80.0	7	
13	.165	72.2	37.9	54.2	38.7	122.5	28.9	—	W.	100.2	2	
14	30.015	62.6	43.4	53.1	44.4	119.7	34.1	W.	W.	205.0	9	
15	29.866	56.8	42.3	50.3	45.0	103.5	40.7	S.W.	S.W.	250.8	7	.15
16	.760	57.8	44.9	49.3	40.8	114.1	33.7	W.	W.	408.9	5	
17	.865	52.6	33.8	47.4	46.1	89.1	24.3	S.W.	W.	244.9	10	.43
18	.623	60.0	49.4	52.1	47.0	110.8	40.1	W.	W. ?	312.4	9	.15
19	29.869	58.4	45.9	51.5	42.8	114.7	40.0	S.W.	W.	311.3	7	.10
20	30.002	58.8	44.1	50.7	42.4	120.5	35.8	W.S.W.	—	233.3	3	.01
21	.352	64.2	37.3	52.5	45.6	126.6	29.4	S.W.	—	83.3	2	
22	.408	69.1	38.2	54.9	42.7	126.0	30.8	S.E.	E.	67.3	0	
23	.216	71.0	43.9	57.9	45.4	123.7	38.2	E.	E.	352.8	0	
24	30.027	67.3	43.9	58.1	41.9	122.6	41.7	E	E.	283.0	0	
25	29.836	71.5	45.4	58.9	49.5	128.4	35.9	E.	S.W.	111.8	5	
26	.835	67.9	48.1	59.2	53.1	119.7	38.2	E.N.E.	S.W.	53.1	9	.15
27	.908	66.6	53.3	57.4	52.5	115.5	50.6	W.	W.	171.7	10	
28	29.985	71.8	52.1	60.4	55.3	119.9	49.5	N.N.W.	N.N.W.	136.7	10	
29	30.097	61.4	52.0	55.8	49.5	95.0	46.1	N.	W.S.W.	132.3	10	.23
30	.827	78.0	44.5	59.3	48.8	125.5	37.5	E.N.E.	E.	144.8	0	
31	30.358	75.3	41.3	61.2	48.8	127.8	37.6	E.S.E	N.	69.5	0	
Mns.	30.121	63.0	42.5	52.9	44.2	115.7	34.9	...	...	5575.3 Sum	4.6	1.50 Sum

Date.	Mean Readg of Baromtr. reduced to Sea Level.	Temperature.						Wind.			Mean amt. of (load 0.0-10)	Rain.
		In the Shade.						Direction.		Velo city Miles		
		High- est.	Low- est.	Adop- ted Mean.	Dew Point.	High's insun's rays.	Lowst on the grass	A.M.	P.M.			
1	in. 30.222	78.0	48.1	63.9	50.6	125.3	39.9	N.	N.	71.7	0	in.
2	.163	77.4	52.6	66.1	54.9	137.8	42.9	N.E.	N.	79.0	6	
3	30.168	78.2	53.4	65.1	52.2	128.6	43.0	N.E.	W.NW	98.2	0	
4	29.968	78.5	47.7	60.9	51.4	180.3	39.1	S.W.	W.	60.4	2	
5	.562	59.1	49.7	54.0	50.9	76.0	49.2	S.W.	N.W.	321.3	10	.61
6	.536	58.0	44.1	51.3	43.4	121.2	38.4	N.N.W	N.N.W	126.8	4	.14
7	29.716	52.1	39.2	45.0	40.0	95.2	30.3	N.	N.P	113.5	7	.07
8	30.028	53.7	38.8	46.0	37.4	109.2	32.8	N.E.	N.	114.8	7	.02
9	.247	54.5	35.8	47.2	39.1	104.1	31.4	N.	N.	112.4	10	
10	.157	55.5	35.1	47.1	42.7	93.0	27.7	S.W.	S.	74.2	10	.15
11	.035	58.0	46.4	52.0	49.8	103.7	47.4	S.	W.	107.6	9	
12	.087	65.9	49.7	57.7	47.8	127.1	49.2	W.	W.	133.4	7	
13	.084	64.2	48.4	55.2	48.2	122.7	42.8	N.	W.NW	60.5	5	
14	30.028	61.8	46.2	56.0	51.7	109.9	36.7	E.	S.W.	84.8	8	
15	29.985	68.4	49.4	57.5	52.0	130.7	50.2	S.W.	S.W.	100.9	9	
16	.925	68.2	52.9	57.7	51.4	103.7	46.0	S.E.	S.	119.4	10	.18
17	.872	65.6	56.1	60.1	56.2	111.7	55.1	S.	S.	215.5	10	.13
18	.829	66.3	55.3	59.7	55.0	108.8	53.4	S.	S.	226.6	8	.03
19	.795	66.1	52.0	58.3	50.9	121.7	51.0	S.	S.W.	155.3	6	.20
20	.728	64.0	52.1	58.7	52.9	114.7	48.2	S.W.	S.W.	193.2	8	.10
21	.557	65.7	56.0	59.4	54.2	123.9	53.5	S.	S.W.	264.3	7	.05
22	29.759	64.0	52.8	57.9	50.0	122.7	46.8	S.W.	S.W.	246.2	4	.28
23	30.180	65.9	50.0	56.6	47.2	124.9	42.4	W.	W.NW	161.4	3	
24	.205	71.3	40.9	58.3	46.1	130.6	34.9	S.W.	S.W.	75.8	2	.08
25	.062	62.1	51.0	55.0	51.0	105.0	46.0	W.S.W	W.	188.0	5	.21
26	30.190	67.1	49.3	58.0	49.8	127.6	41.8	W.	W.	131.0	8	
27	29.973	58.2	52.2	54.9	52.5	81.5	50.3	S.W.	N.W.	110.0	10	.04
28	30.145	63.3	44.4	54.5	47.2	125.6	36.0	W.	W.	101.3	5	
29	.295	66.9	41.0	55.7	49.2	125.9	34.3	W.	W.	135.9	3	
30	30.222	68.0	46.2	57.8	49.1	126.6	37.5	S.W.	S.W.	162.9	5	
Mns.	29.891	64.6	47.9	56.1	49.1	115.7	42.6	...	...	4145.8	63	2.29
										Sum		Sum

JULY, 1881.

Date.	Mean Readg. of Baromtr. reduced to Sea Level.	Temperature.						Wind.			Mean amt. of Cloud (0-10).	Rain. in.
		In the Shade.						Direction.				
		High- est.	Low- est.	Adop- ted Mean.	Dew Point	Highest insun's rays.	Lowst. on the gra-s.	A.M.	P.M.	Velocity. Miles.		
1	ins. 80.015	74.0	53.2	62.6	52.7	135.7	44.0	S.W.	W.	78.4	4	
2	138	70.5	48.4	61.0	51.6	124.2	40.9	N.	W.	132.0	2	
3	197	75.1	52.0	64.6	55.4	131.6	45.5	W.	W.	212.0	7	
4	244	78.4	60.1	67.8	61.3	131.1	57.3	W.	W.	207.0	5	
5	80.005	86.9	56.3	73.1	62.5	136.2	50.5	S.E.	E.	94.3	2	.18
6	29.872	73.8	50.4	59.8	53.6	118.7	42.3	W.	W.	189.4	5	.08
7	80.119	65.2	45.3	56.3	46.2	125.7	35.0	W.N.W	W.	245.1	9	
8	29.986	62.2	51.6	55.6	49.3	118.7	42.2	S.W.	N.	100.0	7	.14
9	30.022	71.5	43.1	59.3	53.5	134.6	34.8	W.	S.W.	89.2	8	.04
10	197	79.6	51.3	62.0	49.3	127.9	45.8	N.N.W	W.	181.9	8	
11	167	75.4	53.3	64.2	51.7	130.7	44.7	S.W.	S.	101.1	4	
12	132	74.4	51.1	62.4	53.1	131.7	44.2	W.	W.	154.4	2	
13	293	71.2	51.0	62.9	56.6	130.1	42.2	W.	W.	198.7	7	
14	281	82.9	58.2	69.4	60.0	133.6	51.5	W.	S.W.	103.6	5	
15	086	87.1	55.0	71.9	58.0	137.4	47.9	W.	N.N.W	48.7	4	
16	091	80.4	59.1	69.2	58.0	138.1	51.5	E.	N.	75.0	5	
17	099	80.2	52.1	66.4	51.3	130.3	46.2	N.N.W	W.	77.3	0	
18	80.012	81.1	54.6	67.6	59.7	132.4	47.8	W.	W.	153.9	3	
19	29.893	84.0	53.3	70.3	60.1	135.6	51.4	W.	S.W.	104.4	5	.04
20	29.929	72.1	54.5	60.9	50.0	129.7	44.0	N.W.	N.N.W	140.9	3	
21	80.050	68.2	46.1	57.2	46.4	128.7	34.8	N.W.	N.W.	84.8	3	
22	29.954	64.0	50.6	57.7	52.5	82.1	41.1	S.W.	S.W.	154.1	10	.03
23	968	71.0	54.2	61.4	54.6	119.0	48.9	S.W.	S.W.	154.7	9	.13
24	834	68.5	55.2	60.9	55.2	118.0	50.6	S.W.	W.	171.6	9	.09
25	690	66.4	47.3	56.5	48.1	123.0	38.3	W.	S.W.	179.0	10	
26	29.725	68.1	47.3	56.9	50.8	128.4	42.8	N.	S.W.	140.5	10	.06
27	80.093	66.6	48.9	56.5	45.0	127.9	35.9	W.	N.	125.6	1	
28	143	69.4	36.2	56.4	48.7	128.4	28.0	S.W.	S.W.	144.8	5	.42
29	30.007	69.9	56.0	61.3	55.6	124.7	52.3	W.	W. ?	247.3	9	.18
30	29.832	63.2	55.9	59.0	56.5	98.0	49.3	S.	S.W.	162.5	10	.69
31	29.570	68.9	55.3	59.8	55.2	120.7	49.6	S.	S.W.	283.4	5	.11
Mns.	80.021	73.2	52.0	62.3	53.6	126.2	44.6	...	...	4535.6 Sum	5.7	2.14 Sum

Date.	Mean Readg. of Baromtr. reduced to Sea Level	Temperature.						Wind.			Mean amt. of Cloud (0.10)	Rain.
		In the Shade				Highest insun's rays.	Lowest on the grass.	Direction.		Velocity Miles.		
		High- est.	Lowest	Adop- ted Mean.	Dew Point.			A.M.	P.M.			
1	ins. 29.844	68.9	46.5	59.7	54.3	128.5	39.9	N.	N.	35.7	9	in. -.04
2	30.167	69.1	50.8	58.7	50.0	121.7	44.7	N.	Calm	67.2	5	
3	.271	69.0	49.1	60.5	57.0	108.7	41.4	W.S.W	S.W.	141.9	10	
4	.295	76.1	58.6	64.9	57.2	129.9	53.1	W.	W. P	125.9	5	
5	.024	80.1	49.4	64.9	57.9	129.5	43.0	S.S.E.	Calm	134.9	5	
6	.169	68.1	51.3	58.6	50.4	117.7	41.7	W.	W	174.4	5	
7	30.091	68.7	50.1	59.7	52.6	117.0	41.0	W.S.W	S.W.	137.2	5	
8	29.714	66.1	53.4	60.2	57.9	104.6	49.3	S.W.	N.W.	157.4	10	.72
9	.752	67.2	50.1	57.8	51.3	123.4	45.6	N.W.	W.	277.8	8	
10	.897	66.4	52.6	57.8	47.8	115.3	44.9	W.	N.W.	224.5	5	.03
11	.976	64.3	44.3	56.2	52.9	102.4	40.3	W.	W.	214.8	10	.41
12	.733	60.9	52.2	54.9	52.9	78.6	53.5	E.	W.	147.2	10	.68
13	.769	61.1	48.6	53.0	46.2	115.5	37.3	W.	W. P	164.6	7	
14	.896	63.4	51.1	55.6	47.4	123.7	49.1	W.	N.W.	193.0	10	
15	.843	61.0	47.0	54.8	51.6	93.2	41.8	W.	W.	126.6	9	.02
16	.582	66.8	54.2	59.5	54.2	112.7	50.5	W.	W.	69.7	10	.30
17	.471	62.1	48.3	55.3	49.4	115.7	43.2	W.S.W	S.W.	195.0	7	.20
18	.705	66.3	46.6	56.8	50.0	117.6	40.8	W.	W. P	155.1	5	.43
19	.603	65.9	49.4	55.5	50.0	121.6	40.5	S.	W.	271.5	5	
20	.932	63.9	43.7	54.9	48.3	120.0	34.0	W. P	S.W.	130.0	8	.01
21	.810	57.3	49.0	52.3	48.6	103.2	47.6	S.E.	S.E.	47.0	5	.96
22	.861	67.1	45.1	57.3	52.0	124.4	38.0	S.W.	S.	103.0	8	.43
23	.649	68.0	53.8	57.8	54.5	105.0	49.0	S.E.	W.	109.0	10	.28
24	.735	63.4	48.3	55.0	50.1	121.7	42.9	W.	W.	130.0	5	.09
25	.569	60.3	50.2	56.9	56.8	70.3	44.4	S.W.	S.W.	281.0	10	.54
26	.511	66.0	52.2	57.9	49.7	122.7	46.3	S.W.	S.W.	304.0	7	.10
27	29.833	63.0	47.0	53.6	46.3	121.0	38.1	W.	Calm.	138.0	4	
28	30.127	64.2	39.1	53.5	48.0	123.9	30.8	W.	S.	126.0	5	.33
29	29.932	59.3	50.3	55.6	55.4	75.8	44.7	S.W.	S.W.	235.0	10	.63
30	29.921	69.2	50.6	57.5	51.6	130.7	51.4	WNW	N.E.	136.0	8	.03
31	30.218	55.9	44.1	50.4	45.3	109.5	39.4	N.	N.	133.0	5	
Mns.	29.870	65.3	49.1	57.0	51.5	113.1	43.5	...	...	4916.4 Sum	7.3	62.3 Sum

Date.	Mean Readg of Baromtr. reduced to Sea Level.	Temperature.						Wind.			Mean amt. of Cloud (0-10)	Rain.
		In the Shade.					Lowest on the grass	Direction.		Velocity Miles.		
		High- est.	Low- est.	Adop- ted Mean.	Dew Point	Highest insun's rays.		A.M.	P.M.			
1	in. 30.291	58.1	47.0	51.2	44.1	111.5	41.9	N.E.	E.N.E.	141.0	9	in.
2	.191	59.9	46.0	52.6	47.5	110.5	41.9	N.	N.	131.0	5	
3	30.032	62.1	46.7	53.4	48.2	109.5	38.8	N.	Calm	75.0	4	
4	29.947	59.6	45.1	52.9	49.9	107.5	36.2	N.W.	Calm	51.0	6	
5	.672	59.3	45.1	53.0	52.5	109.9	36.4	S.E.	S.S.E.	160.4	10	.87
6	.535	63.1	52.5	57.1	51.4	124.8	51.5	S.S.W.	Calm	177.4	7	
7	.702	66.9	50.6	57.6	52.1	120.2	45.5	W.	W.	68.2	5	.02
8	.784	63.3	43.7	54.8	50.5	112.1	37.8	N.	N.N.E.	34.0	5	
9	29.941	67.7	50.9	57.5	52.5	125.0	47.8	N.N.W.	Calm	69.0	3	
10	30.088	57.8	45.3	53.6	50.2	88.3	39.7	N.	N.	70.0	9	
11	.038	54.5	49.1	51.7	48.8	84.2	48.1	N.	N.	116.0	10	.02
12	.072	58.0	51.2	53.6	51.0	75.2	50.6	N.	Calm	94.0	10	
13	.127	63.6	49.6	54.9	50.6	110.0	47.2	S.	Calm	56.0	10	
14	.137	67.4	42.5	54.8	48.6	124.6	36.9	W.	Calm	49.0	2	
15	.172	63.9	45.2	52.9	47.5	113.7	39.1	N.N.E.	N.	55.0	4	
16	30.210	66.9	37.0	52.0	46.5	109.7	32.6	N.W.	Calm	26.0	0	
17	29.960	64.8	44.4	56.4	54.4	104.7	38.0	S.	S.S.E.	128.0	10	
18	.703	74.7	52.5	62.7	57.7	125.6	44.7	S.	Calm	104.0	6	.04
19	.877	66.1	53.3	58.1	52.5	119.7	47.3	W.	S.W.	128.0	5	
20	.710	66.1	49.2	58.1	55.5	124.6	42.1	S.S.E.	S.S.E.	158.0	10	.55
21	.469	62.2	49.9	55.2	51.4	114.9	43.8	S.W.	S.W.P.	159.0	5	.01
22	29.706	61.1	41.2	51.8	48.4	96.7	37.7	W.S.W.	N.N.W.	107.0	10	.03
23	30.053	57.0	51.1	53.8	51.6	71.2	50.9	N.N.W.	Calm	107.0	10	.02
24	.141	60.0	53.4	56.0	54.1	76.0	53.1	E.	S.	126.0	10	.71
25	.095	68.9	48.4	56.4	51.8	119.7	40.9	W.	Calm	145.0	4	.03
26	.143	64.6	46.3	54.9	52.0	116.8	39.7	W.	W.	100.0	5	.03
27	.238	63.1	47.1	52.6	48.4	115.5	39.2	W.	E.P.	48.0	6	.01
28	.376	65.0	43.1	52.8	46.7	115.6	34.8	W.N.W.	Calm	38.0	0	
29	.406	63.3	37.7	50.2	47.4	111.9	30.8	N.E.	S.E.	61.0	0	
30	30.386	62.6	41.2	49.3	45.3	116.6	37.0	E.	Calm	37.0	7	
Mns.	35.307	63.0	46.9	54.4	50.3	108.7	41.7	...	...	2807.0	62	1.84
										Sum		Sum

OCTOBER, 1881.

Date.	Mean Readg of Baromtr. reduced to Sea Level.	Temperature.						Wind.			Mean amt. of Cloud (0-10)	Rain.
		In the Shade.				Highest insun's rays.	Lowst on the grass.	Direction.		Velocity Miles.		
		High- est.	Low- est.	Adop- ted. Mean.	Dew Point.			A.M.	P.M.			
1	ins. 30.287	60.3	38.7	49.3	46.2	120.7	36.5	E.	E.		1	in.
2	.182	60.0	41.3	49.9	41.3	110.3	33.8	E.	E.		0	
3	.196	58.4	37.1	47.9	43.6	109.6	32.1	E.	E.		1	
4	.227	55.0	36.2	45.0	38.0	113.0	27.8	E.	E.		5	
5	.283	49.3	32.1	38.9	34.2	102.5	24.0	N.E.	N.		1	
6	.412	54.1	30.2	43.4	42.4	86.0	21.9	N.	N.		10	.01
7	.496	52.1	45.2	47.4	42.6	79.9	43.1	N.	S. P		10	.38
8	30.043	51.9	43.3	46.9	44.3	105.1	37.9	W.	S.E.		10	.02
9	29.900	52.2	42.8	46.3	43.9	83.2	41.1	W.	S.W.		7	
10	30.040	58.0	36.0	47.9	45.5	109.6	27.6	W.	S.W.		10	.01
11	29.806	58.3	48.2	52.9	49.6	75.5	39.2	S.W.	S.W.		6	.01
12	.830	56.5	43.4	50.5	46.8	95.8	34.5	W.	N.W. P		10	
13	.737	54.7	42.0	49.6	45.5	96.8	33.6	W.	S.W.		6	.31
14	29.419	54.0	43.3	48.4	39.5	99.1	36.1	W.	W.		5	.08
15	30.094	50.1	33.1	40.8	33.8	103.8	24.5	W.	W.		0	
16	.420	51.8	28.0	37.7	31.5	98.7	20.8	N.W.	Calm		1	
17	.386	53.1	25.4	37.9	31.4	99.6	18.6	E.	E.		0	
18	.240	51.1	31.0	41.3	36.5	99.3	24.3	E.S.E.	S.E.		0	
19	30.087	47.9	35.1	40.5	33.7	97.6	29.6	E.S.E.	E.S.E.		0	
20	29.732	49.2	36.3	43.0	36.5	97.7	29.9	E.	E.		8	.04
21	.620	46.2	41.5	43.5	43.2	58.0	40.8	E.	E.		10	.01
22	.287	49.1	45.1	47.7	47.1	53.0	44.7	E.S.E.	E.		10	.42
23	.447	55.6	48.0	51.4	49.7	75.2	43.1	E.	E.		10	.01
24	.675	48.1	44.4	45.9	44.1	60.4	44.0	E.	E.		10	
25	29.894	49.3	37.2	41.9	37.4	101.7	32.9	N.E.	N. P		5	
26	30.156	43.2	37.1	41.9	38.7	101.7	30.8	E.	E.		4	
27	.274	45.7	37.2	40.7	36.0	84.5	31.9	E.	E.		7	
28	.230	44.4	32.9	38.3	36.0	91.7	25.5	Calm	N.		10	
29	.222	42.9	34.4	37.0	32.8	89.2	30.1	N.	E.		10	
30	.306	42.1	28.2	33.2	28.2	87.8	21.8	E.	N. P		4	
31	30.141	43.2	21.3	31.8	28.4	91.0	14.6	Calm	S.		5	.01
Mns.	30.034	51.4	37.3	43.9	39.6	92.8	31.7	...	...	...	5.7	1.26 Sun

NOVEMBER, 1881. .

Date.	Mean Readg. of Barometr. reduced to Sea Level	Temperature.						Wind.			Mean amt. of Cloud (0-10)	Rain.
		In the Shade				Highest insun's rays.	Lowest on the grass.	Direction.		Velocity. Miles.		
		High- est.	Lowest	Adop- ted Mean.	Dew Point.			A.M.	P.M.			
1	ins. 29.804	39.9	34.7	37.7	33.7	44.9	32.0	S.	S.E.		10	in. .03
2	.809	43.9	32.0	36.5	32.3	92.1	28.8	S.	E.	179.0	10	.09
3	.774	52.2	34.0	43.9	44.0	57.8	32.7	S.E.	S.	187.0	10	.20
4	29.900	57.6	48.3	54.8	55.3	69.7	46.0	S.W.	S.W.	238.0	10	.30
5	30.019	57.4	51.0	54.2	52.2	75.1	47.2	W.	W.	275.0	9	.08
6	.233	59.6	39.9	47.1	43.8	101.8	29.9	N.	Calm	85.5	8	.02
7	.199	54.0	39.9	48.9	49.3	62.3	35.6	Calm	Calm	66.3	10	.01
8	.188	54.1	48.2	51.2	50.9	66.0	47.6	Calm	S.E.	102.9	10	
9	.041	55.0	47.3	49.9	46.8	88.1	43.1	S.E.	S.	142.1	10	
10	.125	56.1	47.3	52.7	51.4	67.9	42.1	W.	W.	207.9	10	
11	.218	55.7	48.8	52.4	50.5	76.1	44.8	S.W.	W.	200.3	10	.13
12	.229	57.3	50.6	53.1	50.8	93.2	43.0	W.	S.W.	281.0	10	
13	.435	60.1	50.9	53.8	50.0	102.2	46.1	W.	W.	189.0	10	
14	.341	52.7	45.7	48.5	46.4	61.9	41.7	W.	S.	155.0	10	
15	30.061	53.1	45.2	48.1	43.2	64.0	42.0	S.	W.	270.0	10	
16	29.868	53.1	41.2	48.9	48.1	70.2	34.5	S.W.	S.	317.0	8	.32
17	29.918	53.8	40.4	45.3	40.7	94.8	33.2	W.	Calm	214.0	1	
18	30.322	49.0	31.1	39.9	38.9	46.0	24.4	Calm.	S.E.	80.0	5	.04
19	30.137	50.8	43.2	46.5	42.6	92.9	36.7	S.S.E.	S.S.E.	221.0	5	.04
20	29.963	56.0	43.1	49.8	48.2	95.8	36.9	W.	S.W.	236.0	2	.22
21	.608	52.2	46.0	48.6	45.1	93.1	39.7	S.W.	S.W.	353.0	10	.15
22	.861	50.1	41.8	45.9	40.1	65.9	34.5	S.W.	S.	287.0	3	.11
23	.975	52.2	41.0	45.0	40.3	92.2	32.2	S.W.	S.	189.0	4	.04
24	.928	51.9	40.1	48.1	48.5	63.3	33.8	S.	S.W.	372.0	10	.74
25	.678	52.0	42.5	47.0	45.2	54.3	39.9	S.	S.	132.0	10	.52
26	.290	54.5	36.5	45.8	43.8	65.8	29.8	S.	S.S.W.	307.0	6	.54
27	.011	54.5	42.4	46.2	34.8	87.9	37.3	S.	S.	433.0	1	
28	29.455	57.1	39.7	44.2	40.0	84.4	30.5	S.W.	S.	257.0	3	
29	30.064	51.1	33.1	38.9	35.0	88.0	23.1	W.	S.	42.0	0	
30	30.004	46.4	34.0	42.5	42.8	60.2	23.4	S.S.E.	S.E.	293.0	9	.24
Mns.	29.949	52.9	42.0	47.2	44.5	75.8	36.6	...	...	6312.0 Sum	7.5	3.82 Sum

DECEMBER, 1891.

Date.	Mean Readg. of Baromtr. reduced to Sea Level.	Temperature.						Wind.		Velocity. Miles.	Mean amt. of Cloud (0-10).	Rain.	
		In the Shade.					Highest insun's on rays.	Lowest on the grs's.	Direction.				
		High- est.	Low- est.	Adop- ted Mean.	Dew Point	A.M.			P.M.				
	ins.											in.	
1	30.090	47.9	34.9	40.0	37.7	62.0	26.2	N.	Calm	191	5	.01	
2	.230	51.2	33.6	44.9	45.8	66.6	24.8	S.	S.	213	9	.01	
3	.170	49.4	40.0	43.3	38.9	77.7	32.7	S.E.	S.	259	5		
4	.236	43.5	36.3	40.4	38.9	56.9	27.9	S.S.E.	S.	171	6	.26	
5	.207	51.8	37.8	44.0	42.1	88.0	29.2	W.	N.W.	127	7	.04	
6	30.032	51.1	34.3	44.0	44.7	55.4	26.8	S.	S.	200	10	.50	
7	29.902	51.0	37.0	41.5	37.5	85.1	30.8	W.	Calm	82	4	.01	
8	.884	44.9	33.2	38.1	35.0	82.1	25.1	N.W.	Calm	57	6	.01	
9	.627	39.1	29.0	32.0	29.9	41.5	26.6	Calm	Calm	21	?		
10	.672	32.4	28.2	30.2	30.1	41.0	28.7	N.E.	S.E.	83	10		
11	.779	36.0	26.0	31.2	29.7	72.9	20.4	W.	N.	102	7	.04	
12	29.978	38.1	33.9	35.9	33.9	44.0	30.4	N.N.W	N.	210	10	.02	
13	30.346	40.2	29.2	32.9	30.0	76.1	20.6	E.	Calm	97	0		
14	30.238	40.2	25.7	34.1	33.3	48.9	20.4	S.S.E.	Calm	100	10	.60	
15	29.986	42.1	37.1	39.4	38.8	47.9	36.9	S.S.E.	Calm	116	10	.20	
16	.636	42.0	32.9	37.6	35.4	51.6	26.4	S.E.	S.E.	256	5	.33	
17	.222	49.8	35.9	43.2	40.4	59.8	33.5	W.	W.SW	327	8	.84	
18	.441	50.9	35.0	40.4	31.2	75.9	31.8	W.	W.	314	0	.05	
19	.547	42.5	34.0	38.0	35.1	79.8	25.3	W.SW	S.	145	0	.46	
20	.101	43.4	33.1	39.1	34.8	68.0	31.9	W.SW	N.W.	331	10	.11	
21	29.800	42.5	30.5	35.1	30.6	74.8	20.7	W.	N.W.	254	0		
22	30.022	34.9	23.2	31.0	29.0	40.1	19.1	N.E.	N.E.	71	5		
23	.511	37.7	22.3	27.1	22.4	57.1	15.0	N.	N.	26	?		
24	.499	37.7	22.9	32.4	31.0	61.6	14.4	S.	S.	93	5		
25	.548	41.3	30.9	37.2	36.2	42.9	22.1	S.W.	S.	136	10	.01	
26	.640	41.6	40.9	43.2	43.0	49.2	37.8	W.	S.W.	84	10		
27	.666	44.9	39.9	41.8	40.0	50.2	39.7	W.	S.	114	10		
28	.434	43.0	37.1	39.2	37.6	47.1	30.6	S.	S.	101	5		
29	30.197	46.1	35.7	42.8	40.6	67.9	29.1	S.W.	S.	165	10		
30	29.967	46.5	41.2	43.0	40.5	85.1	33.2	S.W.	S.	206	6	.02	
31	29.871	45.2	40.9	42.8	40.6	68.1	33.1	S.	S.E.	143	10		
Mns.	30.015	43.6	33.5	38.3	36.0	62.1	27.7	...	...	4819 Sqm	6.2	3.52 Sum	

1881.

SUMMARY.

Month.	Mean Reading of the Barome. (reduced to Sea Level.)	Temperature.							Degree of Humidity (Saturation=100).	Wind.							Amount of Cloud.	No. of Days it fell.	Rain.		
		In the Shade.				Direction.															
		Highest.	Lowest.	Mean of all the Highest.	Mean of all the Lowest.	Adopted Mean.	Dew Point.	Mean of all the Highest in the sun's rays.		Mean of all the Lowest on the Grass.	N.	N.E.	E.	S.E.	S.W.	W.				N.W.	
January	ins. 29-913	48.8	6.9	35.2	24.5	29.0	26.3	56.7	20.7	92	1	3	10			3		7.5	10	ins. 2.68	
February ..	29-854	49.8	24.4	42.3	32.9	37.2	31.4	67.8	29.0	93	4	6	4		11	2	1	8	2	3.67	
March	29-919	61.0	22.3	50.2	34.2	41.3	35.7	92.8	29.1	85	0	2	11	1	1	8	15	0	5	11	2.77
April	29-966	62.9	26.2	54.4	36.4	41.6	36.7	105.2	31.5	77	1	6	22	1	0	1	6	2	6	10	0.87
May	30-121	75.3	28.1	63.0	42.5	52.9	44.2	115.7	34.9	72	2	7	9	1	0	7	13	1	4	9	1.50
June	29-991	78.2	35.1	61.5	47.9	56.1	49.2	115.7	42.6	77	2	2	1	1	9	15	9	2	6	15	2.29
July ..	30-021	87.1	36.2	73.2	52.0	62.3	53.3	126.2	44.6	75	4	0	2	1	2	13	19	4	5	13	2.14
August	29-870	80.1	39.1	65.3	49.1	57.0	51.5	118.1	43.5	82	1	0	0	3	2	11	8	2	7	19	6.23
September ..	30-007	74.7	37.0	63.0	46.9	54.4	50.3	108.9	41.7	87	3	2	0	2	3	2	1	2	6	12	1.84
October	30-034	69.3	21.3	51.4	37.3	43.9	39.6	92.8	31.7	86	3	2	19	3	1	4	7	0	5	12	1.26
November ..	29-949	60.1	31.1	52.9	42.0	47.2	44.4	75.8	36.6	93	0	0	1	7	13	12	8	0	7	19	3.82
December ...	30-015	51.8	23.3	43.6	33.5	38.3	36.0	62.1	27.7	93	2	1	0	4	11	3	6	3	6	18	3.52
Year	29-972	87.1	6.9	54.9	40.0	47.0	41.8	94.4	34.5	84	23	31	79	24	53	78	96	24	6	166	32.59

SUMMARY OF THE WEATHER FOR 1881.

JANUARY.

For the first few days the weather was fine, but from the 7th to the 27th it was remarkably cold. The mean temperature of the 2nd and 3rd weeks being $17^{\circ}1$ and $16^{\circ}8$ below the mean. There was a remarkably small amount of rain during the first half of the month, but on the 18th a snow storm of unusual severity occurred. The snow was in very small flakes, and a gale from the East drove it so that it penetrated everywhere. The drifts were in places several feet deep, and the loss of life, both of men and birds, was great. The snow storm was also remarkable for its long duration, exceeding all previous experiences of the kind.

FEBRUARY.

The temperature during the first week was about the average, but increased in severity towards the end of the month. There was but very little sun (more during the third week) and the last half of the month was very dry, though fogs were prevalent.

MARCH.

For the first few days and the last week it was cold, but otherwise the weather was warm and genial, with a continually increasing amount of sunshine, even during the colder period. In the first week it was wet, but otherwise the rainfall was below the mean.

APRIL.

Excepting during the third week, it was decidedly a cold month, and the rainfall was much below the mean. Vegetation was consequently much checked.

MAY.

The cold weather continued for the first three weeks, and sunshine was decidedly on the increase, but the drought which began with the second week in March was very detrimental to vegetation, and the hay crops were

very light. They were, however, saved by some warm rain, which fell about the middle of the month. On the 11th a very severe frost occurred, the temperature being below 18° on the ground. The frost did serious damage to the crops and the young leaves on the trees (especially oaks were terribly cut up).

JUNE.

The first few days were warm, but about the 7th the temperature fell very much, the mean of the following week being 10° below the average, and though it rose gradually, the remainder of the month was colder than usual. Sunshine was deficient during the second and third week, and the rainfall rather above the average.

JULY.

Notwithstanding some very hot days, between the 5th and 14th, (in no case, however, reaching as high as 90°) the temperature of the month, as a whole, was below the mean. A ground frost on the 28th did considerable damage to the young potatoes and French beans. During the last week rain fell frequently, bringing up the total for the month to about its usual quantity. The crops were promising well, and a plentiful harvest seemed almost assured.

AUGUST.

The promises of a fine harvest, which began to be falling off during the last week in July, were utterly ruined in August. A temperature of over 7° below the mean, and an extraordinary rainfall, were the chief characteristics of the month. The frequent showers prevented the corn from being carried, and the constant wetting and drying caused the grain to fall from the ear.

SEPTEMBER.

The weather was for the first half cold, though dry; the second half moderately fine, the fourth week being damp. "The temperature of the dew point was above its average, whilst the temperature of the air was below its average, so that the air was more humid than usual and nothing would dry, greatly impeding harvest operations."

OCTOBER.

A singularly cold month—the coldest at Marlborough since the commencement of observations: "the coldest October about London for 64 years." A violent gale occurred on the 14th, which caused great destruction to trees; elms especially were uprooted, whilst oaks were much damaged.

NOVEMBER.

A wonderful contrast to October. "In the year 1818 the mean temperature of November was 49·2 (at Greenwich), being the warmest November on record, and there was no other instance back to 1771 of so warm a November as this."

DECEMBER.

The weather, though cold during the second and third weeks, was not unusually so, the last week being warm and dry. Fogs were very prevalent, and the range of the barometer very large, over 1·5 inches.

The year is therefore remarkable (1) for very cold periods in January, August, and October, and a very hot one in July; (2) for very heavy snow in January, but little or none after February; (3) for long periods of drought or very small rainfall from the middle of March to the third week in July; and for a drenching August; (4) for a gale in October.

BOYS WEIGHED MARCH, 1874,-76,-78,-80,-81.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
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29	Cholmeley, R.F.	vi	19-0	67-0 0-6	143-2 5-9				
30	Davies, A. Ll.	vi	18-0	70-0 1-0	153-2 5-4				
313	Silver, E.W.	vi	18-4	73-0 2-0	163-5 17-0				
26	Tait, D.	vi	18-5	71-0 0-5	159-5 2-7				

BOYS WEIGHED MARCH, 1875,-77,-79,-81.

107	Lascelles, G.E.	M.U.3	16-10	70-8 4-4	155-5 20-0	38-6 2-1	22-5 0-5	13-0 1-0	9-3 0-6
463	Lawford, H.B.	Up. v	16-10	66-4 4-9	130-0 27-0	31-3 3-8	21-7 —	12-7 0-7	9-2 0-7
554	Robinson, F.S.	vi	18-5	66-2 4-4	180-2 33-2	33-7 3-5	22-2 0-5	12-7 1-2	9-2 1-7
162	Martineau, S.	vi	18-1	68-0 2-7	145-0 25-2	33-7 3-5	21-5 0-5	13-0 0-8	11-4 1-9
68	Saunders, A.N.	M.v.	17-7	63-8 5-0	122-3 29-8	31-8 3-3	21-5 0-5	12-3 0-8	9-3 1-3

BOYS WEIGHED MARCH, 1876,-78,-80,-81.

75	Highton, H.P.	U.S. b	15-6	65-7 2-8	120-2 17-4				
263	Bagge, G.	M.v.	17-6	68-7 1-6	147-5 16-5				
277	Bell, R.M.	M.U.3	17-7	63-0 2-5	110-0 14-7				
265	Laidlay, W.R.	U. v.	18-4	68-0 0-2	120-2 6-9				
521	Leaf, H.M.	U. v.	18-5	69-0 1-7	137-7 8-9				
62	Pulling, H.G.	vi	18-9	68-0 0-7	149-0 4-0				
170	Valentine, T.H.A.	M.M.3	15-7	58-3 1-3	100-0 3-0				
366	Winder, F.B.	vi	17-11	67-0 1-2	137-0 9-7				

BOYS WEIGHED FEBRUARY, 1877; MARCH, 1879; MARCH, 1881.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
159	Bacon, J.S.F.....	vi	16-0	64-5 6-0	122-0 32-5	29-8 8-3	22-5 0-3	18-5 1-5	8-7 0-7
53	Cardew, R.K.....	vi	18-8	68-4 4-9	124-5 27-3	31-0 1-5	21-7 0-2	12-5 1-0	8-8 1-1
109	Clayton, A.G.....	M.U.2	16-5	66-8 4-8	127-0 24-5	29-6 0-6	21-6 0-1	12-1 0-1	8-4 0-4
28	Hobhouse, L.S....	vi	16-6	65-8 5-3	121-0 24-5	28-2 2-0	22-0 —	12-4 0-7	9-5 1-5
196	Jacob, J.L.....	U.S. b	16-0	64-5 5-5	123-2 25-7	30-5 8-0	21-7 0-2	12-6 0-9	8-8 0-8
206	Robinson, F.O. ...	M.U.1	16-6	66-2 4-9	126-0 28-5	30-9 8-9	21-7 0-2	12-6 1-4	8-8 0-8
54	Wood, H.E.	vi	16-2	68-1 5-1	128-0 26-5	30-0 1-5	21-2 0-5	12-5 0-5	9-0 0-5
459	Kynaston, E'.....	M.iv. a	16-7	68-7 5-7	144-5 29-0	30-0 1-0	22-0 0-3	14-5 0-8	10-0 0-5
278	Mahon, E.	U. v	18-9	66-8 1-3	149-0 8-0	33-5 0-5	22-2 -0-3	13-5 —	10-0 —
135	Meyrick-Jones, A.	M. v	18-0	64-1 4-6	138-0 32-0	32-5 4-0	21-5 0-3	13-5 0-8	9-3 0-3
101	Turner, L.A.....	M.M.2	16-8	68-5 3-0	150-5 21-0	34-2 2-7	22-0 0-5	13-7 0-2	9-4 0-4

BOYS WEIGHED MARCH, 1878; APRIL, 1880; MARCH, 1881.

560	*Bent, E.H.	M.L.1	15-0	68-0 7-8	108-7 30-7				
583	Bentlack, W.G....	M.n.2	16-4	68-5 1-2	136-0 6-0				
382	Berteloy, G.A.H.C.	M.iv. a	15-5	60-3 1-7	90-0 7-5				
810	Blandford, W.F.H.	U. v	16-2	69-9 1-9	160-5 16-5				
553	Buckland, E.H....	M. v	16-9	66-3 2-3	126-0 14-0				
81	Chambers, E.K....	L.v.1	15-0	64-5 3-0	114-0 17-2				

* Three years.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lb. inc.
425	Clarkson, R.O. ...	L.v.1	16.1	60.1 2.6	97.0 15.2
435	DeChair, F.B.O....	U.v.1	16.0	69.4 1.9	165.5 18.0
398	Duncan, S.....	U.S.a	15.9	64.8 1.6	118.5 10.7
344	Elam, E.S.....	U.S.b	15.0	64.3 3.3	117.0 14.5
175	Everett, E.H.....	L.v.2	16.8	67.5 0.7	180.5
272	Gabbett, E.	M.M.1	16.1	60.3 2.9	106.5 11.2
558	Garnett, G.B. ...	M.U.2	15.9	66.4 3.3	127.2 18.2
56	Harvey, R.C.M....	vi	16.6	69.5 1.5	153.5 14.0
545	Baillie, A.V.	U.S.b	16.7	66.4 2.5	180.0 17.7
269	Hay, O.G.	U.iv.a	15.4	63.9 3.3	107.2 17.7
393	Hemaley, W.J. ...	vi	16.5	67.0 3.0	180.0 15.0
347	Hookin, H.V.....	M.v	17.1	69.0 3.0	134.5 13.5
280	Jones, R.D.....	U.v	17.1	68.6 0.7	180.5
287	Leaf, C.H.	L.v.2	17.1	63.1 2.0	118.0 11.7
192	Mullens, G.B. ...	M.v	16.10	66.9 3.4	130.0 22.5
46	Rowe, F.E.....	vi.	16.3	66.9 1.1	148.0 24.2
526	Smith, H.E.	M.iv.a	15.3	60.7 2.4	99.2 5.2
353	Taylor, N.O.	M.n.1	17.0	69.5 3.0	141.7 15.9
507	Vaughan-Johnson, H.U.S.a		15.10	68.8 2.0	146.5 23.7
134	Watson, A.H.....	L.v1	16.10	67.5 3.0	126.5 13.7
454	Williams, S.G. ...	M.v	16.8	68.0 2.2	141.0 23.0
234	Jones, R.W.H. ...	U.iv.b	16.9	67.6 2.3	142.0 16.7
478	Petrie, D.W.J. ...	M.M.1	16.7	68.3 2.0	120.0 11.0

BOYS WEIGHED MARCH, 1879: MARCH, 1881.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
506	Arnold, W.B.	M.M.1	15-6	66-5 2-7	145-0 21-0	32-5 1-5	22-1 0-9	12-9 0-9	10-8 1-1
578	Askwith, H.F. ...	L.v.1	15-2	62-7 4-7	112-6 21-7	31-0 2-5	22-0 —	12-0 0-8	8-0 0-5
285	Beresford, J.M. ...	U.iii	15-0	60-6 4-3	90-5 12-5	27-0 1-0	22-0 0-8	11-0 0-5	7-0 0-3
369	Berwick, H.C. ...	M.L.ii	15-10	65-5 5-5	114-5 19-5	30-0 2-3	21-0 0-8	12-0 1-0	8-8 0-6
261	Bett, H.O.	U.iii	13-9	63-1 5-6	109-0 23-0	29-2 1-2	21-0 0-8	12-1 1-1	8-8 0-3
214	Blackall, H.O. ...	M.U.1	16-0	67-9 5-1	143-5 27-7	32-8 4-3	22-0 0-5	14-0 1-0	10-8 1-1
63	Bridges, T.O.	L.iv	12-6	56-2 2-4	80-0 11-5	27-6 1-1	21-5 —	10-2 0-7	6-9 0-7
35	Buchanan, T.G. ...	L.v.2	15-0	63-3 3-5	115-5 16-5	29-0 —	21-1 0-4	13-1 1-1	8-2 0-7
215	Carpenter, E.O. ...	M.L.ii	15-1	60-4 3-9	107-5 13-0	28-3 1-3	20-9 0-2	11-5 0-8	8-5 0-3
490	Cheales, J.P.	L.v.2	15-4	62-9 5-9	130-0 39-5	31-5 4-3	22-2 0-5	13-5 1-5	10-5 2-0
304	Chepmell, C.H. ...	L.v.1	16-9	64-1 5-1	126-5 22-0	30-5 2-0	21-6 0-1	13-0 0-8	9-2 0-7
23	Dalry, B.H.R. ...	U.v	16-0	69-9 3-6	151-5 24-5	31-4 1-9	21-8 0-1	14-0 1-5	9-8 0-8
557	Debenham, E.B. ...	U.S.b	15-9	67-0 7-5	119-0 32-5	30-6 4-9	21-6 0-1	11-9 1-7	8-6 1-4
280	DeChair, R.B. ...	M.L.1	14-9	65-2 5-7	133-0 32-7	32-7 3-7	21-5 0-5	12-7 1-2	9-1 1-1
22	Dupuis, O.E.	M.v	16-6	59-0 3-0	87-0 3-0	27-5 0-8	21-2 0-2	11-5 0-5	8-0 0-5
275	Ellershaw, E.	U.iv.b	13-3	58-4 4-1	100-0 21-7	27-0 1-3	21-0 0-5	11-4 1-7	8-3 0-6
24	Grace, G.H.	M.iv.b	14-2	61-5 4-0	104-0 16-5	29-2 2-2	21-5 0-5	11-9 1-2	8-8 0-6
252	Hamilton, J.Z.M. ...	U.S.a	16-2	63-3 5-5	122-2 29-5	31-0 2-5	21-5 0-5	13-0 1-0	9-8 1-0
32	Hardy, W.E.	U.S.a	15-1	61-0 3-7	111-0 22-0	28-5 1-3	21-7 0-7	12-4 1-2	8-0 0-3
61	Hartley, O.	L.v.2	16-1	64-5 6-7	126-5 34-7	31-2 4-2	21-4 0-4	14-7 3-7	9-2 1-2
571	Keeling, J.H.	U.S.a	15-11	67-8 4-5	133-0 26-0	31-0 2-0	21-5 0-5	13-8 0-3	10-3 1-3
190	Lawrence, P.J. ...	L.iii	14-1	60-4 4-6	103-2 17-7	29-7 2-2	21-7 0-2	12-0 1-0	7-7 0-7
78	Lloyd, M.B.	M.U.2	15-2	64-0 4-0	130-0 26-2	31-8 2-8	22-6 0-4	12-7 0-7	9-0 0-5

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lb. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
362	Mahon, G.	U.S.b	15.5	63.4 6.4	121.0 27.7	31.2 2.2	22.4 0.4	13.0 1.0	9.0 1.0
148	Maurice, G.T.K....	M.L.1	14.0	64.9 3.9	108.5 20.5	29.0 1.5	21.3 0.1	12.0 1.5	8.0 0.3
112	Mullens, H.P. ...	M.iv.b	15.10	64.6 3.3	115.0 14.5	28.0 0.3	22.3 0.3	12.1 0.4	7.7 0.5
5	Parr, T.H.	vi	16.4	62.5 4.0	111.0 20.0	29.3 2.1	21.6 0.1	12.0 1.3	8.2 —
380	Paul, E.M.	L.v.2	16.6	61.0 3.5	99.0 15.3	27.8 0.3	20.7 —0.3	11.7 0.2	7.9 0.4
544	Porter, A.L.	M.U.3	17.2	68.0 4.7	139.0 27.0	30.5 2.0	21.0 0.3	13.0 0.5	10.6 1.9
2	Poynton, A.B. ...	M.v	13.8	56.9 3.1	85.5 13.7	26.0 —	21.1 0.1	11.7 1.0	7.7 0.7
150	Prescott, H.M. ...	U.iv.b	15.0	65.3 3.5	115.0 10.0	28.7 0.5	22.6 0.1	11.9 0.4	8.8 0.1
66	Purcell, A.H.d'O.	L.v.2	15.7	65.0 2.7	124.5 14.0	30.3 0.3	22.5 —	12.8 1.8	9.0 —
303	Sim, G.A.O.	M.v.	15.7	63.0 3.2	136.0 33.0	30.7 2.0	21.3 —	12.8 1.1	8.3 0.8
193	Vassall, H.G.	L.v.2	16.1	65.9 5.4	133.7 26.7	31.0 1.0	21.5 1.0	13.2 1.2	8.9 0.2

BOYS WEIGHED MARCH, '79-'81.

368	Acton, J.	U. iv b	14.1	57.9 3.6	89.0 10.0	26.7 0.2	21.0 —0.2	12.0 0.3	7.5 —
185	Baker, J.J.V.	M. M. ii	16.10	59.8 3.8	96.0 15.7	27.5 1.0	20.5 0.3	12.10 1.8	7.4 0.4
138	Bryant, T.E.	U. iv b	16.6	70.0 3.5	145.7 20.2	31.0 1.5	22.0 —	13.5 0.5	9.6 —0.1
226	Christopherson ...	U. S. a	14.11	61.0 3.5	89.7 4.7	28.4 1.9	22.1 0.6	11.0 —	7.5 0.5
143	Farar, E.M.	M. iv a	15.2	63.3 2.3	92.0 14.2	27.0 1.5	20.7 0.2	11.0 0.8	8.6 0.9
209	Tyler, G.E.	M. iv b	15.1	57.8 2.8	87.0 9.7	29.2 2.5	21.3 0.3	11.0 0.3	7.4 —0.3

BOYS WEIGHED APRIL, 1880; MARCH, 1881.

No.	Name.	Form.	Age. Years.	Height in. inc.	Weight. lb. inc.
165	Adams, A.	U. S. a	15·6	61·0 1·1	96·0 9·5
6	Allington, H.T.G. L. v 1		14·11	60·0 2·7	111·0 16·0
404	Anderson, C.M....	U. iv a	14·5	59·9 1·4	88·5 5·0
387	Atley, G.W.	U. iii	12·10	56·0 1·3	87·5 2·5
198	Banks, V.A.	L. Sh.	12·8	59·0 1·9	92·0 5·0
392	Bliss, F.H.	L. iii	12·7	55·8 1·5	69·5 3·0
131	Browne, L.W....	M. iv b	12·7	57·4 1·4	93·0 2·5
96	Brownjohn, A.D.	U. S. a	14·7	64·4 3·1	115·2 11·7
49	Bullock, L.O.W....	L. v 1	14·6	61·7 1·8	98·2 10·2
381	Butler, E.G....	U. iii	14·2	59·0 0·5	104·0 5·0
155	Carwardine, H.T.	L. iii	13·10	55·0	84·0
397	Chataway, W.P....	M. iv b	15·8	63·5 2·7	121·0 12·0
93	Cholmeley, W.F....	L. iv	14·5	58·1 2·0	91·5 8·0
103	Clark, H.A....	U. S. a	14·3	59·9 1·4	100·2 14·7
520	Clark, L.J.	U. iv	14·6	56·3	99·5
227	Drummond-Hay,F.E. ii		12·7	58·3 1·5	85·0 3·7
110	Eardley-Wilmot,E.	M. M. ii	12·6	60·0 1·9	86·5 6·0
197	Elton, H.G....	U. iv a	16·2	66·5 3·7	136·2 10·7
594	Everett, D.	L. iv	14·7	59·5 1·5	85·5 1·5
390	Filgate,E.P.J.F.M.	M. U. ii	16·0	66·0 3·0	131·0 20·2
92	Foyster, H O.B....	U. S. b	15·0	53·0 1·5	87·5 1·5
417	Hardy, T.	L iv	14·10	66·7 2·7	117·5 11·0
284	Horton-Smith, P.	U. iv a	13·3	58·6 1·7	84·0 7·8

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lb. inc.
592	Hulbert, J.	U. iv a	14.6	63.5 2.6	108.0 7.7
217	Hume, A.S.V.	M. U. 2	15.8	67.0 1.4	139.0 11.0
211	Isacke, E.H.	U. S. b	14.8	55.3 1.8	75.2 1.7
224	Jackson, A.L.	L. S.	12.11	61.0 1.9	101.7 8.2
328	Kaye, C.W.	U. iv a	15.8	66.5 2.4	115.2 7.7
64	Little, J.F.W.	M. v	14.11	54.9 1.9	91.0 8.5
230	Mangles, A.E.R. ...	L. iii	13.10	59.6 1.5	101.0 7.0
591	Marshall, R.H. ...	M. L. 2	15.3	60.5 0.9	94.5 4.0
160	Meyrick, L.O.	U. iv b	14.4	59.8 1.7	98.0 8.5
593	Molony, E.A.	L. v 2	15.2	58.6 1.1	94.5 6.5

BOYS WEIGHED APRIL, 1880; MARCH, 1881.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lb. inc.
565	Penlington, E.T.	L. v 2	15·5	59·0 1·2	93·0 4·5
228	Rendle, H.C.	L. iii	12·5	58·2 1·7	86·0 4·5
69	Roberts, A.W. ...	U. iv a	13·6	64·0 2·3	122·2 12·7
251	Robins, H.H.	M. L. 2	13·9	67·5 1·9	84·0 3·0
152	Ross, A.J.C.	L. iii	13·6	61·2 1·7	112·0 7·5
486	Roupell, G.S.	U. S. a	15·0	67·0 2·7	117·0 12·5
77	Sharp, A.J.	U. iv a	13·3	56·3 1·4	82·5 5·5
286	Sidgwick, C.T. ...	L. S.	13·0	58·6 1·4	83·5 3·5
405	Waddilove, B.A.W.	L. iii	13·10	59·5 1·2	81·0 4·5
442	Williams, A.P.W.	M. L. ii	14·2	63·4 3·6	116·5 15·0
446	Wise, P.F.	U. iii	14·5	61·9 0·9	95·5 6·7
478	Worship, H.L. ...	L. S.	13·6	54·7 0·9	69·5 1·5
441	Wright, J.J.	L. iii	13·10	58·0 1·7	91·0 3·2
351	Lazenby, C.	M. M. 1	17·0	68·9 1·6	142·5 9·0
270	Molesworth, G.N.L.	M. L. ii	15·5	64·0 3·7	111·7 19·2
356	Tufnell, F.T.	ii	13·11	55·1 1·3	86·0 3·2

ENTERED JANUARY, 1881; WEIGHED MARCH, 1881.

No.	Name.	Form.	House.	Born.	Age.		Height.		Weight.		Ochest.		Circumference of		Place of Birth.			
					Years.	Mo.	in.	lb.	in.	lb.	in.	in.	Head.	Leg.		Arm.		
168	Annesley, A.D. ...	Up. iv b	H.B.H.	Oct. 20,	66—14	5	61	2	98	5	27	6	20	7	10	7	5	Cambridgeshire.
237	Blundell, G.E. ...	Up. iv a	L.E.U.	Aug. 5,	67—13	7	58	3	87	0	28	0	21	0	11	5	7	Dorsetshire.
99	Brown, S.R.	L. v 2	M.H.G.	July 9,	67—13	8	60	5	101	5	27	7	21	5	11	7	5	Herts.
352	Clark, H.E.	M. L. 1	G.S.	July 23,	67—13	7	67	0	180	0	31	5	22	0	13	5	8	Punjaub.
14	Clark, S.H.	U. S. b	M.H.G.	July 12,	67—13	8	55	8	74	5	25	7	20	5	11	0	7	Gibraltar.
468	Coats, W.H.	M. L. 2	W.M.	Mar. 24,	68—14	11	58	5	81	5	26	0	20	2	10	5	7	Paisley.
470	Coats, P.M.	M. L. 2	W.M.	Mar. 24,	68—14	11	58	5	83	0	25	7	20	7	10	7	5	Paisley.
458	Crookenden, G.P.	U. iii	W.F.	Ap. 13,	68—12	11	58	5	91	3	27	5	21	7	11	2	7	Blackheath.
245	Dean, J.E.	ii	R.A.	Aug. 10,	70—10	7	54	3	81	5	25	7	20	7	11	2	7	Cheshire.
566	Dobbs, O.E.	M. iv a	J.B.G.	Dec. 26,	68—12	2	58	5	90	5	27	7	21	7	11	0	8	Dublin.
807	Drake, E.O.	U. iii	R.A.	Sept. 26,	67—13	5	60	0	106	0	29	7	22	0	13	7	8	London.
300	Fisher, F.	U. iii	R.A.	Sept. 17,	67—13	5	59	5	97	3	25	7	21	2	11	7	5	India.
232	Ferguson-Davie, A.F.U.	iii	R.A.	July 11,	67—13	8	61	2	98	3	27	5	20	7	11	0	7	Weybridge.
124	Giveen, B.F.	L. v 2	W.J.V.B.	Sept. 10,	66—14	6	55	2	78	0	24	8	21	0	10	9	7	Co. Dublin.
171	Green, C.G.	L. S.	R.A.	Sept. 19,	69—11	5	56	0	82	8	26	7	21	2	10	7	5	Lambeth.
845	Guest, J.J.	L. iv	L.E.U.	July 24,	66—14	7	65	0	114	8	31	0	21	0	12	7	8	Staffordshire.
432	Harding, C.H. ...	ii	T.A.P.	Feb. 16,	68—13	1	52	3	67	3	24	7	19	5	9	7	6	Tipperary.
181	Harvey, E.M.	M. iv a	R.A.	July 27,	67—13	7	59	5	95	5	26	7	21	5	12	5	7	Middlesex.
333	Heaton, G.	U. iii	R.A.	July,	67—13	7												Denbighshire.
329	King-Harman, W.A.	ii	W.M.	Jan. 3,	69—12	2	55	5	80	0	26	0	21	7	10	2	7	Dublin.
487	Kingsbury, W.E.	L. iv	W.F.	May 7,	68—14	10	53	5	99	3	29	5	21	5			8	London.
492	Knight, S.M.	ii	W.E.M.	Ap. 13,	69—11	11	54	8	82	8	26	0	20	7	11	0	7	Middlesex.
34	Lester, H.	L. v 2	M.H.G.	Jan. 8,	68—12	2	60	0	93	5	27	0	22	1	11	0	7	Hertfordshire.

No.	Name.	Form.	House.	Born.	Age. Years.	Height. in.	Weight. lbs.	Chest. in.	Head. in.	Circumference of Leg. in.	Arm. in.	Place of Birth.
564	Lazenby, F.	U. iii	W.F.	May 9, 67—13-10	58-8	95-5	27-0	21-0	11-5	8-0		Clapham.
567	MacInnes, W.B.	M. L. 2	F.E.T.	June 7, 67—13-9	58-5	87-0	25-3	21-0	11-5	7-6		Canada.
505	Matthews, W.A.	L. iii	W.E.M.	Feb. 7, 68—13-1	62-0	106-5	29-5	21-5	11-5	8-0		S. Devon.
156	Meers, E.W.M. ...	U. iv a	J.P.W.	Oct. 12, 67—13-5	58-3	86-2	27-0	21-5	11-5	7-4		Kent.
126	Michell, R.T.	M. iv b	L.E.U.	Feb. 8, 68—13-1	61-0	98-3	30-0	21-2	12-2	7-7		India.
462	Miller, G.A.	L. iv	W.M.	Dec. 6, 67—13-3	59-5	92-5	26-0	21-0	10-7	7-7		London.
291	Mullens, H.A. ...	ii	R.A.	May 9, 69—11-10	58-0	105-0	27-5	21-5	12-0	8-5		Gloucestershire.
410	Pennethorne, H.E.	M. L. 1	T.A.P.	Mar. 5, 68—13-0	59-3	96-8	35-2	21-5	12-0	7-5		Sussex.
184	Poynton, F.J.	L. iii.	R.A.	Jun. 26, 69—11-8	55-0	77-8	26-7	21-0	10-5	7-2		Somersetshire.
210	Price, W.B.	L. S.	R.A.	Feb. 23, 68—13-0	56-8	81-3	26-0	21-0	10-0	7-0		Kent.
552	Rogers, A.E.	M. L. 2	J.B.G.	Ap. 14, 67—13-11	63-2	89-0	26-8	20-9	10-8	8-0		St. John's Wood.
499	Rolleston, G.L. ...	U. S. b	T.A.P.	Feb. 17, 67—14-0	59-3	85-0	26-5	20-7	10-2	6-5		Oxford.
378	Rose, W.A.	M. L. 2	W.H.B.	Feb. 10, 67—14-1	65-3	128-0	31-5	21-0	13-7	9-3		Surrey.
489	Stansfeld, H.H.G.	M. L. 2	H.B.	Feb. 17, 70—11-0	54-0	77-3	25-7	20-7	10-5	7-0		Calcutta.
357	Stayner, F.E. ...	M. L. 2	W.J.V.B.	Mar. 21, 66—15-0	65-1	137-5	31-0	21-5	13-5	9-7		Worcestershire.
242	Streatfeild, G.E.S.	L. S.	R.A.	Mar. 11, 69—12-0	63-1	93-0	27-9	21-3	11-0	7-6		Northumberland.
418	Tyssen, H.S.	U. iii	W.M.	Ap. 9, 67—13-11	59-5	92-3	26-2	21-0	11-2	8-0		Hants.
472	Vans-Agnew, E.L.	U. iv a	J.B.G.	Nov. 26, 67—13-3	60-8	90-5	27-7	21-2	11-2	7-0		Sussex.
186	Waller, E.H.	L. iv.	H.B.H.	Mar. 21, 66—14-11	64-8	130-0	31-5	21-2	12-0	9-0		Coventry.
167	Wanklyn, J.A. ...	L. S.	R.A.	Dec. 16, 68—12-3	56-3	73-5	24-5	21-5	10-0	6-5		Buenos Ayres.
449	White, W.G.	U. S. a	J.B.G.	Jan. 27, 67—14-1	58-0	84-3	26-0	21-0	10-5	7-3		Surrey.
510	Whittow, E.S. ...	M. L. 2	W.E.M.	Oct. 21, 66—14-4	59-6	89-5	27-0	20-2	11-0	7-3		Clapton.
480	Winterbotham, H.B.	M. L. 2	W.F.	Mar. 16, 67—14-0	65-0	117-3	31-0	22-0	12-2	8-7		Gloucestershire.
188	Tindall, E.A.	U. iv a	L.E.U.	Oct. 30, 66—14-4	62-8	116-3	28-5	21-5	12-0	8-5		Manchester.
511	Swanston, E.S.	L. iii	W.E.M.	Oct. 21, 67—13-4	54-0	73-3	25-0	20-5	10-0	7-3		Surrey.

WEIGHED MAY, 1875, 1877, 1879, 1881.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lb. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm in. inc.
52	Bullock, S.L.	U. iv a	16-11	64-0 3-0	111-5 13-5	29-0 1-5	21-7 -0-1	11-5 0-8	8-0 —
399	Fanshawe, R. ...	M. U. i	17-6	65-5 4-2	123-2 25-8	29-3 2-3	21-7 0-2	12-7 0-7	9-1 0-9
204	Kirkpatrick, G.A.	U. v	17-7	63-0 4-7	105-5 16-5	30-2 0-7	21-2 -0-5	11-2 0-2	7-8 -0-7
180	Westcott, G.H. ...	vi	19-1	64-0 3-0	138-5 23-0	32-3 3-3	21-6 -0-1	12-5 0-5	10-2 1-0
218	Williams, A W A.	M. v.	16-4	62-0 4-7	127-0 16-0	31-5 2-5	22-4 0-4	12-6 0-6	9-0 0-5

WEIGHED MAY, 1876, 1878, 1880; JULY, 1881.

264	Callendar, W.J. ...	vi	16-11	66-3 2-1	136-3 20-8				
31	Davies, M.L.	vi	16-9	66-0 3-5	131-5 15-7				
177	Hardy, R.	Mod. M. 1	16-2	64-5 3-4	141-5 22-0				
440	Wynyard, W.B.A.	L. v 2	17-3	69-6 0-7	152-5 2-0				

WEIGHED MAY, 1877, 1879, 1881.

313	Boulton, W.W. ...	Mod. M. 2	15-10	64-9 6-4	137-7 32-7	32-0 2-0	21-3 0-3	12-1 0-6	10-1 0-4
292	Cannon, P.H.	M. iv b	15-0	61-7 5-2	101-5 16-5	27-3 1-3	20-9 0-2	12-2 0-7	7-9 0-4†
548	Cunningham, R.H.	Mod. M. i	17-0	66-0 5-0	126-0 28-0	31-0 3-0	21-5 0-3	12-5 1-3	9-5 1-0
563	Druitt, A.	vi	18-1	69-0 1-0	151-0 8-7	34-5 1-5	22-5 0-3	12-7 0-7	10-0 0-3
408	Fox, W.H.	M. v	17-6	64-5 4-5	118-3 23-8	31-0 2-0	21-7 0-2	12-2 1-2	8-7 0-7
459	Fox, G.	U. S. b	15-8	62-2 6-2	119-0 20-5	30-2 3-2	22-3 0-3	12-9 1-4	9-4 1-4†
364	Larkworthy, G.C.	M. v	17-4	67-5 4-7	126-5 21-3	31-7 2-2	21-8 0-1	12-8 0-5	9-5 0-8
577	Nugent-Bankes, J.	Mod. M. 1	15-10	62-2 7-2	108-0 25-0	27-3 1-3	21-3 0-6	11-4 0-9	8-0 0-5*
383	Prest, E P.	M. U. 1	17-4	68-0 3-0	150-5 26-5	36-0 5-5	22-5 0-3	14-5 0-5	9-6 0-6†

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
260	Ravenhill, H.R....	M. U. 1	16-9	65-4 3-1	133-7 21-7	29-6 1-6	22-5 —	13-0 1-0	10-5 1-3
325	Reiss, L.H.J.	U. v	17-0	64-2 3-2	122-8 18-3	29-5 2-0	21-3 -0-4	13-0 0-3	9-5 0-8
166	Stoherd, E.A.W.	M. U. i	17-3	69-0 6-0	134-3 30-3	29-5 2-0	21-7 0-2	13-0 1-3	8-6 0-6
248	Leigh, J.R.	vi	19-0	69-0 3-2	142-5 29-5	33-0 3-5	22-0 0-3	13-9 0-9	10-0 0-3†
320	Pawle, E.D.	U. S. b	17-0	63-2 4-9	153-0 32-0	34-0 4-3	21-5 —	14-0 1-3	9-3 0-3
504	Steel, E.E.	M. M. ii	17-0	65-6 5-6	125-7 29-2	29-0 2-0	21-7 —	12-5 1-0	8-7 0-7

* 4 years. † May.

WEIGHED MAY, 1878—1880; JULY, 1881.

128	Adams, E.P.	Mod. M. 2	16-0	68-0 3-0	102-0 11-5				
359	Beale, E.L.	Mod. U. 1	17-9	68-8 0-8	147-0 11-2				
65	Beatson, D.J.M....	Mod. U. 2	16-10	67-5 2-1	121-5 7-0				
238	Chittenden, G.S....	M. v	17-3	68-4 0-2	122-5 8-5				
282	Dobie, L.J.	L. V. 2	17-5	69-0 2-8	133-3 20-3				
380	Freeman, H.R. ...	M. V.	17-3	64-0 3-0	120-8 19-0				
221	Hovell, D.deB. ...	M. L. 2	15-4	60-0 2-3	101-8 13-8				
133	Mangin, R.R.	U. v	17-8	68-3 1-1	149-5 13-2				
519	Nicol, W.J.W. ...	M. U. 2	17-4	63-2 3-2	118-3 15-0				
343	Ouvry, E.C.	L. iv	14-11	59-0 2-3	106-0 25-0				
494	Palgrave, A.G. ...	Mod. M. 2	16-0	61-0 1-7	101-0 8-2				
60	Streatfield, H.C....	L. v	14-8	64-8 4-0	115-5 14-0				
375	Wilson, S.B.	L. v. 2	17-1	65-0 3-7	107-8 14-3				
9	Sanderman, V.S. ..	M. L. 1	16-1	64-9 4-2	123-5 23-5				

WEIGHED MAY, 1879; JULY, 1881.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
274	Badcock, A.J. ...	M.iv.b	15-1	58.0 3-5	86.0 18.0	27.0 0-3	21-3 0-3	11-3 0-6	7-6 0-6
531	Brooke, A.D.	M.U.1	15-9	69-2 1-7	151.0 7-0	34-4 0-2	23-3 0-1	14-0 —	9-5 -0-5
583	Brooking, A.H. ...	U.S.b	13-7	65-7 3-2	108-3 10-8	23-5 1-5	22-3 0-3	13-0 0-8	8-5 0-5
271	Browne, G.H.S. ...	U.S.a	14-11	66-6 4-8	124-3 27-0	29-2 0-7	21-1 -0-6	12-7 2-0	8-6 0-9
337	Collet, B.S.	M.iv.b	15-5	63-0 6-0	108-3 26-8	27-3 1-6	21-0 0-3	12-4 0-9	8-0 1-0
514	Colley, F.O.	U.iv.b	16-4	64-5 6-0	112-0 27-5	28-8 2-3	22-0 0-3	11-9 —	8-7 1-3
486	Davis, E.H.	Mod.M.ii	15-11	67-6 7-0	144-3 35-3	31-0 3-8	22-7 —	14-2 2-2	9-3 1-0
584	Doering, W.H. ...	Mod.M.ii	16-7	69-8 3-3	140-0 22-5	31-0 2-0	22-7 0-5	14-2 1-2	9-5 0-8
515	Fielden, G.N. ...	M.iv.a	15-7	65-7 4-2	108-0 11-5	27-0 —	20-8 0-1	12-0 1-0	7-4 0-2
432	Few, R.E.	Mod.M.i	15-10	61-0 3-0	94-0 8-7	26-0 —	20-8 -0-2	12-0 —	7-6 0-4
466	Gamon, J.P.	U.S.b	16-3	67-0 6-7	129-8 32-8	29-4 3-4	21-6 0-6	13-5 1-5	9-0 0-8
194	Gregory, C.A.O.T.	U.iii	14-2	57-2 3-2	84-3 9-3	25-3 -0-7	20-5 —	11-0 1-0	7-5 0-8
216	Grove, A.S.	Mod.M.ii	16-10	64-5 6-0	111-5 27-0	28-4 2-4	21-6 0-4	12-2 1-2	8-5 0-5*
582	Hart Dyke, R.P.	U.iv.b	16-8	61-1 2-6	111-3 22-3	26-0 —	21-9 -0-1	10-9 -0-3	7-8 -0-5
331	Horne, J.A.	M.iv.a	15-0	58-0 3-2	86-5 13-5	27-0 1-5	21-1 0-1	11-0 0-5	7-7 0-2
586	Leslie, B.	U.S.b	15-9	62-0 3-7	101-0 17-0	26-8 0-8	22-0 1-0	11-9 0-4	7-8 0-1
583	Mollwraith, R.M.	L.v.2	15-11	67-0 5-0	127-0 20-7	29-0 —	21-1 0-1	12-5 0-5	8-7 0-5
372	Mead, F.J.	M.U.1	15-8	64-1 4-8	119-0 22-5	26-3 1-8	21-6 0-1	12-8 1-3	9-1 1-1*
173	Nicholson, J.	M.iv.b	14-7	64-8 3-6	102-5 14-7	26-5 1-5	21-9 0-2	11-5 0-5	7-6 -0-1
229	Pepys, H.F.	M.iv.a	16-0	60-4 5-1	99-0 20-0	27-0 1-9	20-6 0-1	12-0 1-0	8-0 0-8
117	Robertson, J.O. ...	U.iv.b	15-1	64-9 4-6	123-0 27-0	30-0 2-3	21-6 0-1	13-0 1-3	8-8 0-8*
219	Stileman, C.F. ...	M.iv.b	16-6	62-3 6-2	114-0 27-5	29-0 2-0	21-8 0-3	13-0 1-0	9-0 1-0
119	Street, C.	M.L.i	14-9	60-9 3-6	107-5 15-5	28-5 1-5	21-5 0-3	11-9 0-4	8-8 0-3*

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
350	Swinton, J.E.B....	M. U. 2	16-11	69 0 2-7	136-5 22-5	31-0 3-0	21-4 0-4	13-3 0-6	9-0 0-8
262	Teesdale, E.J. ...	M. iv a	15-6	62-5 6-0	119-0 25-0	29-6 3-1	21-5 —	12-3 0-3	8-6 0-1
207	Villiers, W.N. ...	U. iv b	16-6	67-2 4-2	130-5 23-0	30-6 1-5	22-0 0-5	13-0 0-8	8-5 0-5
371	Wansey, A.A. ...	M. M. ii	15-11	63-3 8-0	137-5 31-0	29-5 1-5	21-0 —	13-2 1-2	8-7 0-7
587	Yeates, F.W.....	M. M. ii	15-5	63-4 6-4	153-5 45-5	31-3 2-0	21-2 0-5	13-9 0-9	9-4 1-2*

* Weighed in May.

BOYS WEIGHED MAY, 1880; JULY, 1881.

No.	Name.	Form.	Age. Years.	Height in. inc.	Weight. lb. inc.
561	Allen, P.E.....	L. iv	16-1	61-5 2-5	93-0 10-0
570	Batley, R.A.	L. iii	13-3	58-5 2-1	88-5 5-5
383	Berkeley, R.T.M.	L. Sh.	13-9	55-6 2-1	84-5 4-3
415	Bett, T.O.	M. L. 2	12-10	60-5 1-8	101-5 1-0
182	Barrows, P.	L. Sh.	12-10	56-0 1-5	86-5 2-0
244	Casson, H.A.	U. S.	14-1	62-0 3-5	99-0 8-2
89	Clayton, F.....	M. U. 2	14-2	62-0 2-8	91-0 8-5
484	Colville, H.O.A. ...	M. L. 2	18-1	61-0 1-2	97-0 5-5
395	Cooper, H.J.	U. iii	13-7	59-0 1-5	86-5 2-2
502	Dawson, E.B.....	U. iv. b	15-9	70-4 3-5	126-5 14-5
267	Dobie, H.	M. M. ii	16-1	58-5 1-5	82-5 6-2
164	Elles, J.M.....	M. M. 1	15-5	60-8 2-2	108-0 7-5
589	Falkener, E.P.B.	M. L. 1	13-9	53-5 1-3	93-0 1-0
48	Field, A.B.....	L. iii	13-0	57-2 0-7	81-0 5-0
540	Forbes, J.O.	U. iv	14-5	64-2 2-9	103-5 8-0

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lb. inc.
560	Hill, H.B.	M. L. ii	14.8	65.5 8.6	113.0 13.5
261	Hill, E.B.	L. S.	13.1	59.0 1.9	95.5 6.5
569	Jenner, L.L.C.A.	U. iv a	15.7	63.5 3.0	114.5 9.5
407	Langworthy, J.D.	L. iii	14.0	54.6 1.6	73.3 -0.2
412	Langworthy, B.	L. iii	12.7	55.4 1.6	75.5 3.5
455	Lowndes, H.M. ...	M. L. 1	14.7	59.3 1.6	89.5 6.2
83	Paine, W.H.O. ...	L. S.	12.7	52.0 2.3	63.5 1.0
309	Percival, A.P. ...	U. iii	12.1	54.7 -0.7	72.5 1.5
477	Petrie, O.L.R. ...	M. M. 1	14.6	60.1 4.0	93.5 14.0
86	Rotheram, W.H.	M. U. 2	15.4	71.5 3.5	157.0 25.0
179	Silver, A.G.	M. iv b	16.1	62.2 3.0	108.0 15.5
163	Walker, L.S.	L. Sh.	12.0	54.8 1.3	71.5 0.5
161	White, B.F.	L. iii	14.1	56.2 1.2	80.3 3.3
15	Williams, W.S....	M. M. ii	15.1	63.1 3.6	108.5 19.0
312	Zachary, T.	M. L. i	15.5	66.2 -0.1	135.3 11.3

BOYS ENTERED MAY, 1881.

No.	Name.	Form.	House.	Born.	Age. Years.	Height. in. lbs.	Circumference of		Uses of Fifth.
							Chest.	Leg.	
						in.	in.	in.	
113	Adams, J.H.	ii	R. A.	May 5,	7.0-11.0	53.7 75.0	26.0 20.0	10.5 7.0	Kent.
279	Alexandroff, J.	M. L. ii	W. M.	Mar. 30, 67-	14.3	60.5 97.0	27.5 20.5	11.5 7.4	Manchester.
71	Allen, A.G.	M. iv b	T. A. P.	June 28, 67-	14.0	65.7 119.0	27.5 21.0	13.1 8.0	Hampstead.
178	Boldero, W.	L. S.	R. A.	June 27, 69-	11.10	53.3 72.5	23.7 20.7	10.5 6.9	Wilt.
529	Cairnes, F.H.	M. L. ii	W. E. M.	Nov. 13, 67-	13.7	68.5 87.5	26.0 21.7	11.0 7.5	Co. Meath.
539	Coote, W.G.	U. iv a	W. E. M.	July 6, 66-	14.10	66.0 119.8	29.0 21.0	13.5 8.0	Liverpool.

No.	Name.	Form.	House.	Born.	Age. Years.	Height. in.	Weight. lbs.	Circumference of			Place of Birth.
								Chest. in.	Head. in.	Leg. Arm. in.	
167	Cowley-Brown, G.O.	ii	R.A.	Mar. 29, 69	12.1	53.1	67.0	24.5	20.3	9.6	Oxford.
158	Darell Brown, A.F.	Liv	R.A.	June 7, 67	13.11	60.8	85.0	27.7	20.5	10.5	Worcestershire.
91	De Satgé, E.E.	Liv	R.A.	Sept., 67	13.8	54.6	67.8	23.8	20.5	9.8	Sydney.
122	Ford, F.C.	U.iii	R.A.	Sep. 21, 67	13.8	68.5	118.0	27.8	20.9	11.7	Buenos Ayres.
286	Gordon, F.	U.iv.a	M.H.G.	Dec 14, 66	14.5	58.5	75.5	24.3	20.3	10.3	Hants.
511	Harding, S.A.	M.L.ii	W.E.M.	Mar. 5, 68	13.4	62.0	96.0	26.4	21.1	11.5	Reigate.
21	Hayburnst, H.F.	L.v.ii	M.H.G.	Nov. 16, 66	14.6	51.0	89.5	27.0	20.8	10.6	Westmoreland.
501	Hilleary, L.M.	U.iv.b	W.E.M.	Aug. 13, 67	13.9	61.7	100.0	26.0	20.6	11.2	Tottenham.
41	Hills, H.G.	U.iv.a	M.H.G.	Dec. 8, 66	14.5	63.1	124.5	28.2	21.4	11.3	London.
85	Lambert, C.H.	L.iii	R.A.	May 28, 68	13.1	56.0	78.3	24.5	21.2	10.3	London.
185	Lascelles, W.C.	U.iii	R.A.	July 5, 67	13.10	63.4	99.8	27.5	21.1	11.7	Goldsbrough.
186	Lascalles, B.F.	L.S.	R.A.	Dec 3, 68	12.5	61.7	85.8	24.5	20.7	10.7	Goldsbrough.
575	Lewis, G.	ii	F.E.T.	April 19, 69	12.1	59.0	86.3	25.5	20.7	11.0	Hornsey.
472	Linnell, A.J.	M.iv.a	J.B.G.	Oct. 5, 66	14.9	63.9	100.3	27.0	21.5	11.5	Red Hill.
429	Logan, N.W.	U.iii	A.H.B.	Dec. 21, 67	13.5	56.5	80.3	26.3	21.0	10.3	Liverpool.
291	Martyn, A.	L.iii	A.H.B.	Nov. 17, 63	12.6	60.6	97.0	26.8	21.8	11.2	Devon.
568	Merry, W.J.C.	L.v.ii	F.E.T.	June 29, 67	13.10	62.4	115.3	30.7	21.6	11.3	Oxford.
43	Mothersole, H.B.N.	L.iii	R.A.	Oct. 3, 69	11.7	54.5	71.3	24.0	21.0	9.0	Berks.
83	Pemberton, E.	U.iii	R.A.	June 17, 68	12.11	57.5	78.8	26.8	20.0	10.0	Cheshire.
340	Robertson, W.A.	L.iii	W.F.	Aug. 24, 63	12.8	61.1	103.0	28.5	21.5	11.8	Forfar.
311	Verity, E.G.	ii	T.A.P.	April 12, 69	12.1	50.3	72.8	23.7	20.6	10.3	London.
491	Willis, H.H.	L.iv	J.B.G.	Jan. 1, 67	14.6	61.7	101.0	29.0	21.5	12.5	Trobridge.
483	Woodhouse, A.D.	M.L.ii	J.B.G.	June 30, 66	14.10	59.5	85.5	25.0	20.6	10.7	Cheshire.
206	Yeatman, F.P.S.	U.iii	R.A.	Oct. 12, 69	11.7	56.4	71.5	23.7	20.4	10.2	Bromley.

5

WEIGHED OCT., 1874-1876; NOV., 1878; OCT., 1880; DEC., 1881.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lb. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
326	Callendar, H.L....	vi	187	71-9 0-9	164-0 13-0				
111	Firth, H.R.	vi	17-9	68-5 2-6	141-0 7-7				
341	Tanner, M.....	L. v. 2	17-1	68-2 2-2	142-2 10-2				
51	Turner, A.B.	vi	19-2	70-5 1-0	160-0 19-0				

WEIGHED OCTOBER, 1875, 1877, 1879; DECEMBER, 1881.

389	Dickinson, A.E....	M. U. 2	16-11	71-8 2-3	150-0 31-5	31-4 2-4	22-2 0-3	13-0 1-0	9-6 0-4
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BOYS WEIGHED OCT., 1876; NOV., 1878; OCT., 1880; NOV., 1881.

33	Alston, F.S.	L. v. 1	17-11	69-0 0-9	140-0 8-0				
479	Bake Gabb, E.F.H. L. v. 1		17-5	65-5 1-0	125-0 9-0				
247	Casson, F.G.	L. v. 1	17-8	69-5 2-2	131-2 17-4				
534	Cooke, F.W.	M. U. 1	17-5	70-9 0-7	157-5 5-5				
255	Curtois, A.....	U. v	16-1	63-4 3-8	100-0 14-5				
11	Gardiner, E.N. ..	vi	17-1	75-8 2-3	150-2 18-7				
305	Martineau, H. ...	M. U. 1	17-2	67-9 1-9	127-5 13-2				
306	Martineau, L. ...	M. M. 1	15-8	68-1 3-6	180-0 16-0				
70	Mason, F.E.	M. U. 1	17-1	66-4 2-5	141-0 18-2				
116	Mocatta, E.H. ...	M. M. 2	16-5	62-0 1-0	131-5 10-5				
424	Thomas, E.W. ...	M. M. 1	16-6	68-9 2-2	137-7 18-9*				
97	Vincent, E.O.....	M. v	17-7	63-3 2-4	114-2 11-7				
121	Wanchope, D.M. M. v		17-8	70-2 2-2	146-5 2-5				
411	White, E.D.	M. U. 2	16-4	63-0 3-0	111-5 14-0				
183	Wynne, O.	L. v. 2	17-6	66-2 1-3	132-7 11-9				

* Last weighing, July 1880.

WEIGHED OCTOBER, 1877, 1879, 1880; DECEMBER, 1881.

No.	Name.	Form.	Age. Years.	Height.		Weight.		Chest.		Head.		Leg.		Arm.	
				in.	inc.	lbs.	inc.	in.	inc.	in.	inc.	in.	inc.	in.	inc.
260	Adams, E.E.	M. M. 2	17-1	66-5	6-7	130-0	37-5	31-0	3-0	21-9	0-2	11-3	1-3	8-6	1-1
401	Beaton, W.M. ...	vi	16-1	66-0	4-7	138-0	35-0	30-5	2-0	21-7	—	13-1	1-4	9-2	0-7
74	Bradburne, O.E. M. iv		15-9	68-0	6-2	127-5	29-0	30-5	2-0	21-6	0-1	12-5	0-3	8-7	0-5
574	Brinton, H.	vi	18-9	68-5	3-0	145-0	21-5	32-6	2-9	22-3	0-2	13-1	0-4	10-3	1-6
249	Bryaus, A.H.	U. S.	16-5	69-7	3-9	145-0	30-7	33-7	1-7	22-3	0-6	12-6	1-1	10-4	1-4
125	Chichester, A.G.D.V. M. 1		15-0	68-0	3-2	95-0	17-5	27-5	1-0	21-1	0-4	11-0	0-3	8-3	0-3
12	Coddrington, O.T. M. L. 1		16-4	64-8	5-0	124-5	32-5	29-0	1-8	21-5	—	12-5	1-0	9-3	1-1
10	Donne, J.R.	M. U. 1	18-6	71-0	8-5	145-0	24-0	31-5	1-5	22-3	0-2	12-6	0-6	10-3	1-8
220	Earle, S.	L. v. 1	16-10	68-3	5-0	153-3	28-3	33-9	4-4	21-5	0-3	14-0	1-3	9-8	0-8
1	Elliot, G.J.	vi	17-6	64-5	4-0	121-0	28-0	29-0	0-5	22-3	0-3	12-5	—	8-0	—
115	Firth, E.C.	vi	16-1	65-3	6-0	124-0	29-2	29-5	2-0	22-0	—	12-6	1-0	8-7	0-5
555	Forbes, D.	M. U. 1	16-9	64-1	5-1	128-2	29-7	30-0	1-5	21-0	—	13-0	0-8	9-2	1-2
254	Grant Dalton, S. M. v		17-2	67-0	2-2	144-0	21-7	31-6	2-6	22-2	—	14-0	0-5	9-7	0-5
88	Innes, A.D.	vi	18-2	68-2		130-0		29-6		21-2		12-8		8-6	
316	Laidlay, C.E.	U. v	17-9	65-0	0-2	135-8	10-0	30-0	—	21-3	0-2	13-1	0-6	9-0	—
76	Lewis, W.B.	M. U. 2	17-5	68-8	5-8	149-5	40-7	31-2	3-5	21-9	0-4	13-5	1-5	10-1	1-6
19	Maddock, P.H. ...	vi	18-7	67-6	3-1	143-7	28-4	22-5	2-0	21-6	0-1	13-0	0-3	9-4	0-7
153	Moore, W.	U. S.	17-0	68-7	3-9	128-0	19-2	28-9	0-8	22-0	—	12-6	0-6	8-2	—
154	Moore, J.	U. iv	15-10	63-2	4-9	117-5	26-2	29-5	1-5	21-5	—	12-0	0-5	8-8	0-3
172	Pedder E.	U. iv	16-11	62-8	4-8	113-3	21-3	29-7	0-2	21-5	0-3	12-3	1-3	8-6	0-6
18	Roberts, C.H.	vi	16-3	72-0	6-5	142-5	35-5	28-4	1-4	21-7	0-2	14-0	1-5	8-7	0-7
315	Rogers, W.A. #...	L. v 2	17-3	68-8	3-8	165-5	36-0	33-7	2-2	22-4	0-4	14-5	1-3	10-0	1-3
58	Streatfield, W.O. ...	U. v	16-3	64-8	5-8	133-0	35-0	31-0	2-5	21-2	0-8	12-7	0-7	9-3	1-3
343	West, H.	U. iv	17-0	66-7	6-9	127-0	35-2	32-2	4-7	21-2	—	12-6	1-1	9-4	1-4
430	Wilson, J.E.B. ...	U. S.	16-7	65-5	3-5	136-0	27-0	31-0	2-0	22-5	—	13-5	0-3	9-3	0-6

BOYS WEIGHED OCTOBER, '78-'80.—NOVEMBER, '81.

No.	Name.	Form.	Age. Years.	Weight. in. inc.	Weight. lb. inc.
78	Anusley, E.O. ...	L. v 2	16-6	66-0 3-4	122-7 17-2
327	Bligh, F.....	M. M. 2	15-5	61-5 2-6	107-7 12-4
240	Bliss, C.E.	M. iv	14-11	62-7 1-9	100-0 10-0
356	Boger, D.C.	M. U. 2	16-1	66-4 2-7	130-7 16-7
37	Bradley, H.V. ...	U. v	16-8	65-3 0-6	127-0 11-2
369	Carey, H.M.	M. U. 1	17-11	68-2 0-4	150-0 7-0
189	Chappel, H.E. ...	L. v 2	14-7	63-8 1-9	100-0 5-6
132	Coates, H.W.U....	U. S.	15-11	65-8 2-9	119-5 18-0
449	Cooper, T.	M. v	18-4	72-5 0-2	165-0 10-5
447	Cooper, C.E.	M. iv	14-4	59-0 2-4	93-5 8-2
444	Cooper, H.E.	U. iv	18-8	65-5 1-7	104-0 6-5
499	Crommelin, A. O de la C. vi		16-9	65-0 4-5	118-5 18-0
498	Dawson, A.E.....	L. v 2	17-10	69-0 0-8	142-0 12-0
386	Dobson, F.T.S. ...	vi	17-6	63-0 0-6	150-0 10-0
319	Dowding, H.A. ...	U. S.	16-4	63-4 2-7	115-6 16-7
281	Earle, L.....	M. M. 1	18-10	64-5 6-5	121-0 31-7*
233	Feetham, O.	M. iv	16-1	60-8 1-6	110-0 10-0
474	Ferguson-Davie, H.A. L. v.		16-3	67-0 3-5	131-5 19-5
123	Footman, J.	U. S.	15-11	67-3 3-4	113-0 14-0
191	Fowler, E.S.	vi	17-6	69-8 1-0	132-0 12-2
426	Hankey, E.P.A....	M. v	17-0	69-4 1-5	149-5 12-2
13	Horsburgh, O.W. vi.		17-3	71-2 1-6	156-0 19-0

* 3 years increase.

No.	Name.	Form.	Age. Years.	Height. in. ino.	Weight. lb. ino.
500	Eort, A.F.	vi.	17-10	72-3 1-8	167-0 23-5
102	Hughes, E.T.A. ...	M. v	17-8	68-8 1-8	180-7
308	Juchas, F.A.	U. S.	16-4	71-0 0-8	162-5 11-5
433	Lascollas, C.H. ...	M. M. 2	16-10	68-3 2-7	123-2 21-9
416	Manton, H.R.	M. M. 1	15-5	61-1 2-0	104-7 6-7
59	Martin, D.E.	L. v. 1	15-3	68-5 3-2	129-0 23-0
368	Monney, D.J. ...	U. iv	16-7	64-6 0-6	136-5 11-0
374	Nelson, E.	U. iv	16-3	67-0 3-0	137-5 24-0
200	Orr, H.H.	L. v. 2	16-11	65-9 2-9	128-7 15-7
467	Padwick, F.G. ...	U. v	16-2	69-5 1-8	162-2 7-2
263	Peake, A.	M. L. 2	14-7	63-2 2-2	105-5 12-0
509	Porter, H.O.	U. iv	16-5	65-8 2-4	130-0 15-5
293	Prichard, M.S. ...	M. v	16-10	65-0 2-4	105-0 9-0
394	Quinton, F.W.D. ...	M. U. 2	15-11	69-0 2-0	144-5 12-7
445	Randolph, G.B. ...	M. U. 2	17-1	66-4 4-8	122-0 18-2
243	Randle, A.O.	U. S.	15-4	60-6 2-4	105-0 14-2
119	Rew, C.E.D.O. ...	U. iv	15-1	62-5 2-1	112-8 21-0
495	Scovell, C.T.E. ...	M. U. 2	17-5	67-5 0-4	165-0 17-5
285	Sharp, W.H.	vi.	16-5	65-5 3-2	115-2 16-2
189	Smith, C.G.	M. U. 1	16-8	63-3 3-3	115-0 18-0
365	Stewart, W.B.O. ...	M. L. 1	15-11	66-2 0-2	142-2 8-7
108	Stothard, L.H.K. ...	M. U. 2	16-1	62-5 5-7	107-0 18-6
301	Tufnell L.C.G. ...	M. L. 2	16-1	65-5 7-2	124-7 36-7
580	Ward, O.R.	U. S.	17-4	70-0 0-5	130-0 4-7
89	Warren, A.K.	M. iv	15-7	63-5 4-0	119-0 20-5
149	Woolner, H.	U. S.	15-2	69-8 3-6	152-7 23-7

8 Years.

WEIGHED OCTOBER, 1879, 1880; DECEMBER, 1881.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
246	Allen, J.W.....	Up. Sh.	16-8	68-5 2-6	160-5 18-5	32-5 0-8	22-2 —	14-2 0-2	9-5 1-3
498	Archer, D.O.	M. M. 1	15-5	64-5 6-0	136-0 36-0	30-0 3-5	21-4 0-4	13-5 1-5	9-2 1-2
288	Barrow, V.E.....	M. M. 2	16-1	59-5 6-0	113-8 28-3	29-0 2-0	20-6 0-6	12-7 1-0	8-7 1-0
385	Beale, G.G.....	M. L. 1	13-7	61-6 5-0	100-2 24-4	28-0 1-0	20-6 0-1	12-2 1-2	7-1 0-1
406	Bent, P.S.	Up. iii	14-10	63-0 4-0	108-5 14-2	27-7 1-0	21-8 0-1	12-4 0-4	8-0 0-5
419	Bere, M.A.....	M. iv	15-1	69-0 6-6	132-0 36-0	31-5 3-5	22-0 0-5	12-1 0-6	8-7 1-2
241	Bowly, D.	M. M. 2	16-1	63-5 5-0	112-8 23-8	28-5 2-0	21-5 —	12-4 1-2	8-3 0-6
145	Rucknall, H.C. ...	L. iv	15-2	60-7 3-9	105-5 16-5	30-2 0-7	21-3 0-1	12-6 1-1	8-8 0-8
146	Bucknall, P.E. ...	Up. iii	14-3	58-7 4-2	97-0 15-5	28-8 0-8	21-7 0-2	11-7 0-7	8-1 0-4
589	Bull, F.E.....	Up. v	15-3	67-3 6-0	140-0 36-0	31-5 2-5	22-8 0-3	13-0 1-0	9-0 0-6
456	Cayley, D.L. A....	M. L. 1	17-3	62-6 2-1	110-5 11-0	29-8 0-3	21-2 0-3	13-0 0-5	9-0 0-8
546	Chaine, W.....	Up. Sh.	16-6	68-8 3-3	138-5 22-5	31-2 2-5	22-5 —	12-9 0-4	8-7 0-5
253	Clark, D. M.	M. M. 1	16-10	65-5 5-2	127-5 30-0	29-9 0-4	21-8 0-1	13-0 1-0	9-0 1-0
302	Crookenden, O. P.	M. M. 1	16-3	65-8 6-3	128-2 36-2	29-7 2-7	22-2 0-5	12-5 1-5	8-7 1-0
40	De Jersey, N.S....	M. iv	15-10	68-0 4-0	142-0 21-5	31-5 2-3	22-1 0-1	13-0 0-8	9-5 0-5
174	Dennis, L.	M. M. 1	16-10	64-7 3-9	123-8 22-0	30-7 2-5	21-6 0-1	12-5 0-5	9-3 1-1
239	Fairbairn, A.M....	M. L. 2	15-0	65-0 5-5	108-2 17-2	27-5 1-0	21-7 0-2	10-9 0-4	7-6 0-2
25	Ffenden, G.C.F.A.S.	Up. iv	15-8	62-5 6-0	114-0 26-5	27-6 0-4	21-6 0-5	13-0 1-0	8-0 0-8
84	Goodacre, H.G....	M. M. 1	16-4	65-8 5-3	118-5 25-0	29-0 1-0	21-5 —	11-8 0-6	8-6 0-6
355	Grenfell, W.T. ...	L. v. 1	16-9	67-2 6-2	144-0 37-0	31-8 2-3	22-7 0-7	13-9 1-9	9-5 0-8
17	Harding, G.V. ...	Up. v	16-9	65-7 1-7	139-5 16-5	31-5 1-5	22-0 —	14-0 0-8	10-0 0-5
256	Hill, W. A.	Up. iv	15-9	59-7 2-4	97-8 10-3	26-7 0-2	21-7 —	10-5 0-5	8-0 0-8
367	Hill, T. H.	M. L. 2	14-6	58-0 2-7	89-0 9-0	26-5 0-2	21-3 0-2	10-7 0-2	7-4 0-2

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
323	Hughes, E.B.A.I...	M. iv	15-9	64-7 6-7	118-0 33-0	30-7 4-7	21-2 0-7	18-5 1-8	8-5 0-8
258	Hughes, E.H.....	M. U. 1	15-9	63-1 6-0	131-0 29-5	30-6 1-6	21-7 0-2	18-2 1-7	9-0 1-0
142	Lance, C.H.	M. iv	16-0	63-2 3-7	107-0 14-5	26-4 0-1	21-8 0-1	12-3 0-8	7-8 0-1
4	Lias, O.R.	L. v. 2	15-9	59-4 4-1	101-0 16-5	27-7 0-7	21-8 0-2	12-3 1-3	8-3 0-3
50	Lister, A.H.	M. v	17-0	68-9 5-1	145-0 35-5	32-5 0-8	22-5 0-8	13-3 1-8	10-0 1-5
485	Marley, K.R. ...	M. M. 2	16-9	65-6 3-6	144-8 27-3	31-7 1-7	21-5 0-5	13-9 1-4	10-3 1-6
140	Nicholson, C.L. ...	M. U. 2	16-0	62-5 6-5	112-5 29-5	30-0 3-0	21-5 0-5	11-6 0-9	8-4 0-9
391	Nicholson, H.F....	Up. Sh.	16-0	64-0 5-5		30-0 3-3	21-4 0-4	12-5 1-0	8-0 —
523	Nowell, E.W.	M. U. 2	16-8	67-5 2-0	152-3 24-3	32-0 3-0	21-7 0-2	14-0 0-5	9-6 0-6
187	Ogborne, L.C.W.	M. iv	15-0	61-8 4-3	96-3 16-3	27-0 1-5	21-0 —	12-0 1-0	7-7 0-2
44	Powles, F.J.E. ...	Up iv	14-9	60-3 4-5	118-0 27-5	30-3 2-8	21-7 0-2	18-0 1-5	8-8 0-8
299	Preston, C.S.	Up v	16-8	70-8 5-3	150-0 13-4	33-5 4-5	22-4 0-4	14-5 1-0	9-4 1-2
90	Rawlinson, O.B...	U. S.	15-7	63-4 4-4	124-0 24-0	28-8 1-1	21-8 0-3	13-0 0-8	9-5 1-3
524	Rendel, L.J.....	M. M. 1	16-0	68-6 4-1	121-5 25-0	32-1 4-6	22-0 0-5	13-0 1-0	9-5 1-3
342	Reynolds, B.L. ...	M. iv	15-4	56-9 2-9	95-0 9-0	26-0 0-5	21-0 0-2	12-6 1-1	8-1 0-1
413	Rickards, R.W. ...	U. iv	16-2	60-5 4-2	100-0 20-0	25-7 0-8	22-0 —	13-0 1-3	7-6 0-4
414	Rickard s, H.B. ...	L. iii	18-10	56-6 3-3	88-0 18-5	25-5 0-8	20-8 0-1	12-0 0-5	8-0 0-8
106	Robertson, H.B...	L. v 1	15-5	66-9 1-9	140-0 21-5	31-6 1-1	22-5 0-3	12-5 0-5	9-8 0-6
428	Robertson, E.....	U. S.	14-10	68-1 5-1	149-0 33-2	33-5 3-5	22-3 0-3	14-1 1-4	9-5 1-3
7	Sale, T.R.	U. v	16-8	66-6 4-1	132-0 27-5	30-6 1-9	21-5 0-5	13-1 1-1	8-5 0-5
493	Schilizzi, E.S.....	vi	16-5	63-3 2-5	119-0 11-0	30-6 0-1	21-7 0-2	16-0 0-5	9-3 0-3
541	Sharp, H.O.....	U. v	16-5	71-9 4-9	158-5 32-0	34-5 1-5	21-5 0-2	13-7 0-7	9-4 0-4
486	Soden, A.S.	M. M. 1	16-3	60-2 3-4	103-3 19-5	25-3 1-6	20-2 —	11-5 0-8	8-3 0-1
196	Thring, L.C.W. ...	L. v 1	16-4	55-2 1-4	89-0 12-5	29-0 —	20-5 —	10-9 0-7	7-2 0-5

No.	Name.	Form.	Age. Years.	Height in. inc.	Weight. lb. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
127	Thruston, A.B. ...	U. v	16 10	61.8 2.5	105.5 15.5	28.6 0.6	21.5 —	11.8 0.8	7.7 0.5
576	Townsend, B.	U. S.	16 7	70.5 2.7	151.5 21.0	33.0 1.5	22.3 0.1	13.8 0.8	9.5 0.3
318	Trehewy, T.L. ...	U. vi	14.5	61.7 4.7	103.5 20.5	28.7 1.2	21.0 —	12.0 1.0	8.4 0.7
334	Usher, B.G.	M. v	14.9	57.7 2.7	93.0 12.7	27.5 0.8	22.3 0.1	11.9 0.9	7.7 0.2
WEIGHED OCTOBER, 1880—NOVEMBER, 1881.									
597	Alexandroff, N. ...	U. S.	15.10	68.7 2.2	139.7 16.7				
396	Alston, J.E.	M. iv	15.4	62.5 2.5	136.2 46.7				
321	Back, G.S.	U. S.	15.11	63.0 2.5	101.5 4.5				
276	Badcock, E.B.	M. iv	15.10	63.1 3.3	110.7 19.3				
525	Belk, C.	M. L. 1	15.0	56.3 0.7	190.0 7.0				
580	Beynon, W.G.L. ...	M. L. 1	15.0	60.2 1.6	94.5 3.5				
476	Briscoe, B.B.	U. iii	13.11	59.0 2.0	89.5 3.5				
532	Browne, A.B.	M. M. 2	15.8	65.4 1.8	127.0 23.0				
80	Capell, A.	L. v 2	17.4	67.4 0.2	132.0 —				
549	Chaine, J.	U. iv	14.11	64.2 3.0	115.0 12.5				
596	Clowes, W.A.	M. M. 2	14.11	58.4 1.2	105.5 21.0				
507	Cochrane, A.O. ...	U. iv	15.2	68.0 2.6	136.5 18.5				
600	Curtis, G.S.	M. v	14.5	61.5 1.4	100.0 18.7				
67	Daunt, A.	M. iv	14.10	63.8 1.8	114.0 10.0				
114	De Jersey, B.H. ...	L. iv	13.7	61.1 1.5	89.0 7.2				
86	Dolphin, H.B.	L. S.	13.7	63.0 1.7	102.0 9.7				
38	Dundas, E.N.	U. S.	14.10	66.0 2.6	137.7 16.7				
239	D'Urban, H.L. ...	M. v	15.9	63.2 1.3	138.0 8.0				
176	Forrester, G.B. ...	M. M. 2	15.6	67.1 4.1	133.2 26.7				

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lb. inc.
370	Freelan, L.G. ...	U. iii	14·7	57·1 2·5	80·0 5·7
371	Freeland, A.D. ...	L. iv	13·7	52·5 0·9	66·2 2·2
434	George, E.S.	M. L. 2	14·0	62·3 3·7	119·3 20·3
409	Griffith, T.F.	M. iv	14·5	63·1 3·6	114·5 21·5
297	Hamerton, L.C. ...	M. iv	14·9	64·9 3·1	120·7 14·3
508	Hayward J.A. ...	U.S.	15·7	63·3 2·8	112·0 15·5
599	Herbert E.C.	M. M. 1	16·3	59·3 2·5	101·0 13·3
42	Jackson, A.B.	U. iv	13·8	56·5 1·6	74·0 1·5
377	Kekewich, H.H. ...	M. iv	15·1	63·9 2·4	118·0 10·0
451	Macanlay, P.J.F.	M. M. 1	14·10	64·5 2·0	114·0 6·7
314	Macpherson, A.H.	M. iv	14·10	57·7 1·6	80·0 7·5
384	Mahaffy, A.W. ...	U. iii	12·1	58·7 1·7	91·5 7·0
120	Marsh, N.N.	U. iii	13·10	58·3 2·8	100·0 9·5
536	Martelli, W.G. ...	M. M. 2	16·1	65·0 1·0	130·0 8·2
598	Mavrugordato, S.J.	M. M. 2	15·6	62·0 1·5	115·5 14·0
203	Meyrick-Jones, F.	U. iv	14·10	61·0 1·6	104·7 6·2
335	Molony, J.R.H. ...	M. iv	14·7	58·8 1·7	87·3 3·8
512	Neate, R.M.	M. M. 2	14·9	65·8 2·0	132·0 14·5
585	Nicholson, B.E. ...	M. L. 2	14·6	62·4 2·6	100·0 4·0
16	Olivier, H.E.	L. v. 2	15·9	59·2 2·4	100·0 12·0
554	O'Neil, E.A.	M. iv	15·1	66·5 3·5	136·3 20·8
596	Ord, R.W.	M. iv	14·3	60·4 4·1	100·0 18·7
438	Palmer, O.P.	L. iii	12·11	54·2 2·1	76·5 5·7
403	Phillips, P.C.	L.S.	13·3	53·0 1·2	71·0 4·0

No.	Name.	Form.	Age. Years.	Weight. in. ino.	Weight. lb. ino.
208	Preston, H.S....	L. v. 1	15-4	68-0 3-6	136-0 19-7
249	Roberts, R.O.....	M. iv	15-2	63-0 3-0	116-5 10-0
119	Robinson, J.	U. iv	16-0	64-9 1-7	131-5 13-5
537	Shepherd, E.B. ...	U.S.	15-7	57-2 1-4	90-7 5-7
231	Stanton, H.L. ...	U. iv	14-0	62-0 1-9	118-0 13-0
105	Streatfield, G.H.M.	M. iv	14-0	57-3 1-6	92-0 5-2
273	Walker, N.C.....	U. iv	15-11	67-0 2-7	138-0 19-5
503	Webb, Ware, F.C.	L. iv	15-0	71-0 2-9	151-5 23-5
36	Weatherhead, A.S.	L. v. 1	15-6	57-0 1-6	86-2 10-2
27	Wynne-Willson, A.B.	U. S.	14-7	60-0 0-9	104-0 10-2
202	Wood, E.B.	M. M. 1	13-9	63-6 2-0	106-0 8-0
563	Wright, J.O.	M. iv	15-2	61-2 2-6	100-0 4-0
354	Yale, T.P.O.	M. L. 1	13-8	61-7 2-9	103-0 3-2
423	Young, G.J.	U. S.	15-9	65-5 3-3	113-7 13-9

BOYS ENTERED SEPTEMBER, 1881; WEIGHED NOVEMBER, 1881.

No.	Name.	Form.	House.	Born.	Age. Years.	Height. in.	Weight. lbs.	Circumference of			Place of Birth.
								Chest.	Head.	Leg.	
								in.	in.	in.	
104	Ashfield, C.E.	U. iv	W.J.F.	Jan. 9, 67—14-10	63.0	114.0	80.0	21.4	12.0	9.0	Ledbury
363	Atkinson, G.A.	L. v. 2	A.H.B.	Jan. 27, 67—14-9	61.2	101.5	26.2	21.2	12.3	7.7	Westmoreland
324	Bainbridge, E.G.T.	M. L. 2	T.A.P.	Nov. 11, 67—14-0	60.0	85.5	27.4	21.5	11.5	7.5	Kent
268	Barlow, M.H.P.	L. S.	T.A.P.	Jan. 30, 69—12-9	59.0	81.0	26.5	20.2	10.3	7.0	Bombay Presidency
547	Barnicott, R.A.	M. L. 2	W.E.M.	July 10, 68—13-4	58.1	85.0	25.5	21.0	11.0	7.3	Huddersfield
234	Benson, E.F.	U. S.	H.B.H.	July 24, 67—14-4	59.3	107.5	27.0	21.7	12.0	8.1	Berks
295	Berwick, A.S.	M. iv	J.P.W.	Jan. 1, 67—14-10	60.8	99.3	27.0	20.5	11.4	7.5	Ceylon
534	Blosson, S.G.	M. iv	W.E.M.	June 5, 67—14-5	57.3	80.5	25.7	21.3	10.5	7.3	Edgeware
366	Bowles, A.E.	M. M. 2	A.H.B.	Nov. 7, 66—15-0	62.5	102.8	28.9	21.0	12.0	7.4	London
457	Broadbent, C.H.	U. iv	F.E.T.	May 19, 67—14-6	62.9	115.3	29.7	21.6	12.2	8.2	Warrington
418	Brown W.F.	L. iv	J.E.G.	Aug. 9, 67—14-3	61.2	103.5	27.5	21.5	11.9	8.0	Cardiff
29	Bryant, A.	L. iii	R.A.	Ap. 10, 69—12-7	57.4	87.5	26.5	20.6	10.4	7.5	Wills
452	Cadell, A.	M. M. 1	J.B.G.	Jan. 27, 67—14-10	65.6	132.0	30.0	21.3	12.4	9.3	Bombay
359	Campbell, R.G.	M. L. 2	W.F.	May 18, 67—14-6	59.9	89.0	24.3	21.5	11.5	7.4	Leicestershire
320	Carden, J.B.	U. iv	T.A.P.	July 7, 67—14-4	62.0	97.8	28.5	21.3	10.8	7.4	Templemore
68	Carey, D.V.	M. L. 2	H.B.H.	Nov. 2, 66—15-0	61.0	93.8	26.0	21.4	11.2	7.5	Lucknow
450	Carruthers, J.E.	L. iv	J.B.G.	Nov. 13, 66—15-0	60.0	95.0	26.0	20.6	11.7	7.0	Chepstow
138	Chappel, G.P.	Up. iii	R.A.	Nov. 9, 68—13-0	62.2	111.8	24.0	21.0	12.0	8.3	Cornwall
147	Colville, C.B.	ii	R.A.	July 29, 70—11-3	57.8	81.5	25.7	20.7	10.4	7.0	Sandhurst
30	Davies, G.L.	M. iv	R.A.	July 13, 68—13-4	56.8	91.0	26.9	21.1	11.5	7.7	London
270	Druce, W.C.	ii	T.A.P.	May 17, 69—12-6	57.5	83.3	25.4	20.3	11.5	7.3	London
523	Durlacher, M.J.	ii	W.E.M.	Nov. 6, 70—11-0	54.5	83.0	26.8	21.0	10.8	7.2	London

No.	Name.	Form.	House.	Born.	Age.		Height.	Weight.		Circumference of		Place of Birth.
					Years.	in.		lbs.	in.	Chest.	Head.	
225	Eden, W.A.	L. iv	H.B.H.	Ap. 21, 68—13 7	57-0	57-0	83-5	26-1	21-0	11-5	7-1	Nottingham
52	Ferguson-Davie, F.A.L. v 2		R.A.	July 15, 67—14 4	59-5	59-5	97-2	27-5	21-1	11-6	7-3	Norfolk
332	Finch, E.G.	L. iii	W.M.	June 23, 63—12 5	57-1	57-1	77-0	25-0	20-5	10-1	6-6	Hants
338	Finch, H.K.	L. iii	W.M.	July 22, 70—11 4	52-0	52-0	68-5	24-6	20-6	9-9	6-4	Hants
521	Francis, L.A.	M. iv	W.E.M.	Jan. 20, 67—14 10	56-5	56-5	85-0	26-3	20-0	11-0	7-5	London
268	Grimmit, H.J. ...	ii	T.A.P.	Feb. 23, 69—12 9	58-5	58-5	97-8	29-6	20-5	12-5	8-0	Stanton-on-hill
45	Haweis, L.T.J. ...	ii	R.A.	Aug., 70—11 3	51-3	51-3	66-5	24-4	19-7	10-0	6-9	Lichfield
157	Hay, J.A.	L. iii	R.A.	Oct. 19, 68—13 1	60-4	60-4	94-8	26-8	20-8	11-5	7-8	London
376	Houghton, J.M. ...	ii	H.B.	June 27, 70—11 4	68-3	68-3	69-5	24-5	19-7	10-2	6-7	Salisbury
8	Houseman, A.D.J.	L. S.	R.A.	May 9, 69—12 6	58-1	58-1	89-5	25-7	20-6	11-0	7-5	London
400	Hulbe t, J.G.	M. iv	J.B.G.	Sept. 14, 67—14 2	59-9	59-9	102-5	27-0	22-0	12-8	7-9	Middlesex
212	Hume, R.O.C. } ...	Mod. M. 2.	W.J.V.B.	Ap. 5, 67—14 7	62-2	62-2	119-3	28-7	21-5	13-0	8-2	Clifton
360	James, J.E.	Up. iii	A.H.B.	Jan. 3, 70—11 10	57-0	57-0	89-5	25-5	21-5	11-6	7-8	Lambeth
143	Kaye, E.P.	Up. iv	H.B.H.	Jan. 8, 68—13 10	65-0	65-0	109-5	28-1	21-2	12-0	8-1	Wakefield
538	Laundon, E.E.B. ...	L. iv	W.E.M.	June, 67—14 5	62-9	62-9	112-0	27-0	20-9	12-6	8-3	Pernambuco
518	Lewis, H.M.	L. v	W.E.M.	July 11, 67—14 4	63-6	63-6	116-5	30-5	21-5	13-1	8-9	Kennington
531	Martineau, G.	M. iv	W.E.M.	Aug 18, 67—14 3	62-2	62-2	100-0	28-8	21-1	11-1	7-9	London
403	Maxe, R.E.H. ...	L. iii	A.H.B.	Oct. 8, 69—12 1	57-9	57-9	86-0	27-7	20-7	11-0	7-3	Hamburg
141	Murton, O.L.	U. S.	M.H.G.	July 8, 67—14 4	59-0	59-0	100-0	28-8	21-0	12-6	8-0	London
62	Oakley, A.W.	M. U. 1	M.H.G.	July 31, 66—15 3	68-1	68-1	111-3	28-5	21-3	11-5	8-2	London
278	Papillon, J.G.	L. iv	W.M.	Sep. 24, 67—14 2	61-9	61-9	111-3	27-3	21-5	12-8	8-6	Essex
277	Papillon, G.K.	L. iv	W.M.	Sep. 24, 67—14 2	60-0	60-0	106-0	26-5	21-1	12-5	8-2	Essex
179	Preston, A.S.	U. S.	G.S.	Dec. 3, 67—13 11	63-7	63-7	104-5	27-5	21-7	11-4	7-8	London

No.	Name.	Form.	House.	Born.	Age. Years.	Height. in.	Weight. lbs.	Chest. in.	Circumference of			Place of Birth.
									Head.	Leg.	Arm.	
									in.	in.	in.	
248	Procter, E.L.....	M. iv	R.A.	Sep. 29, 66—151	54.5	80.0	25.0	29.9	10.3	7.4	7.4	Yorkshire
72	Palleine, H.P.....	U. iv	R.A.	Sep. 24, 67—14.2	59.5	109.0	27.8	21.5	12.0	8.1	8.1	off Oeylon
8	Ram, E.D.S.	L. iii	R.A.	Dec. 29, 68—12.11	57.4	91.0	27.0	21.0	11.9	7.8	7.8	Highbate
103	Reynolds, S.H. ...	L. iv	W.J.V.B.	Dec. 16, 67—13.11	60.2	98.0	27.0	21.7	12.5	7.6	7.6	Brighton
356	Ridley, G.L.N. ...	L. S.	W.F.	Feb. 9, 69—12.9	59.0	80.0	26.0	20.0	10.5	7.4	7.4	Warwickshire
216	Risley, J.S.....	L. v 1	L.E.U.	Dec. 22, 67—13.11	59.3	90.8	25.8	20.5	11.5	7.4	7.4	Kent
218	Routh, E.A.	M. iv	R.A.	May 31, 68—13.5	58.2	88.0	26.8	21.2	11.0	7.5	7.5	Cambridge
373	Sinclair, W.H.M.	L. iii	A.H.B.	Dec. 24, 68—12.11	62.8	123.0	27.7	21.7	13.9	9.1	9.1	Dublin
346	Smith, A.M.	M. iv	W.F.	Ap. 25, 68—13.7	58.2	98.0	27.8	21.5	11.7	7.5	7.5	Delamere Rectory
269	Silver, W.B.	M. M. 2	G.S.	Ap. 26, 68—15.6	67.7	122.0	28.5	23.0	12.4	8.3	8.3	West Cowes
351	Stanton, C.G. ...	ii	H.B.	July 17, 71—10.4	50.2	64.8	23.5	21.9	10.2	6.8	6.8	Leeds
185	Stanton, E.A. ...	M. M. 1	R.A.	Nov 15, 67—14.0	61.4	105.5	30.6	21.6	11.6	8.8	8.8	York
118	Stiffe, A.F.E.....	U. iv	R.A.	July 5, '67—14.4	60.0	94.0	26.9	21.5	11.4	7.5	7.5	Kurachee
203	Street, G.	ii	R.A.	Jan. 31, 70—11.9	56.0	79.5	25.1	20.8	10.8	6.8	6.8	Exeter
26	Tait, D.J.	U. iii	R.A.	May 11, 70—11.6	64.9	104.8	26.8	21.5	12.2	7.5	7.5	Wilks
223	Thornton, E.E.D.	M. L. ii	M.H.G.	July 14, 67—14.3	62.4	111.0	28.7	21.1	12.3	8.3	8.3	East Indies
209	Wainwright, W.L.	M. iv	R.A.	Ap. 1, 68—13.8	58.1	92.0	27.4	21.2	12.0	7.9	7.9	Wandsworth
544	Watson, G.....	M. L. ii	W.E.M.	Nov. 16, 66—15.0	60.5	97.0	26.0	21.0	10.8	7.5	7.5	Lancashire
469	Webber, A.....	U. iv	F.E.T.	Oct. 25, 67—14.1	57.7	88.5	27.5	21.2	10.8	7.2	7.2	Cannes
222	Weston, R.S.	U. iv	W.J.V.B.	Aug. 67—14.3	62.3	111.0	28.5	21.0	12.4	8.5	8.5	Clapham
188	Williams, H.F.B.	L. V. 1	L.E.U.	Ap. 4, 67—14.7	53.1	88.0	26.2	21.0	11.8	8.0	8.0	London

THE following extract from the Report of the Anthropometric Committee to the British Association, 1880, will show that our tables are appreciated by men who are in a position to judge of their value :

VI. MARLBOROUGH COLLEGE STATISTICS.

Though it does not in any degree enter into the contemplation of the Committee to discuss the returns of any particular college or establishment in detail, and indeed it would be foreign to their purpose to furnish the means of comparison that might be invidious between one institution and another, the series of 1850 observations made during several years by Dr. Fergus on boys in Marlborough College, and communicated to the Committee by the Rev T. A. Preston, have been thought by the Committee to constitute an exception, and it has been considered advisable to prepare abstracts of them as affording an excellent example of the usefulness of systematic records.

EYESIGHT.

REPORT of MR. CHARLES ROBERTS, Member of the Anthropometric Committee of the British Association, on the Observations on Eyesight and Colour-blindness made at Marlborough College :—

The difficulty experienced by many observers of obtaining sufficient space and light for testing the eyesight by the test-dots (which are distinguishable to the normal eye in good daylight at a distance of 19 yards) has induced the Committee to use Snellen's test-types, No. 1 and No. 10, as more convenient and trustworthy. No. 1 is a small type visible to the normal eye at the ordinary reading distance of from 12 to 20 inches, and No. 10 is a large thick type one-fifth of an inch square, distinguishable by the normal eye at a distance of 10 feet.

The Rev. T. A. Preston, one of the masters at Marlborough College, has examined the eyesight and colour-sense of the whole of the boys and some of the masters at present in the College, and the following is an analysis of his returns. The observations include the age, the colour of the iris, the eyesight as tested by No. 1 and No. 10, and the letters composed of horizontal and vertical lines for astigmatism; and the colour-sense as tested by the methods of Dr Daae and Professor Holmgren (and in a few instances by the solar spectrum), according to the book of tests which I have prepared for the use of the Committee ('The Detection of Colour-blindness and Imperfect Eyesight': Bogue).

AGE.—The ages of the boys range from 11 to 19 years, and those of the masters from 20 to 50 years, five of the latter being over 40 years.

COLOUR OF EYES.—The following Table shows the colour of the eyes of the boys and masters under 40 years of age, divided into two groups—those who are under and those who are above the age of 15 years.

Colour of Eyes.	Under 15.		Over 15.		Total.	
	No.	per cent.	No.	per cent.	No.	per cent.
Dark blue.....	2	.9	7	1.9	9	1.5
Blue	62	28.1	98	27.9	160	27.8
Light blue	32	14.5	51	14.4	83	14.4
Grey	48	21.7	72	20.3	120	21.0
Brown grey (green)	23	10.4	36	10.1	59	10.3
Light brown (hazel)	52	23.5	83	23.4	135	23.5
Dark brown	2	.9	7	2.0	9	1.5

From the similarity of the percentages of the two periods it would appear that little change takes place in the colour of the iris after the age of 15 years, as the dark eyes are barely one per cent. greater in the later than the earlier period. The proportion of fair to dark eyes is 64·7 to 35·8, or about two fair to one of dark complexion.

COLOUR-BLINDNESS.—Of the 600 boys and masters, 15, or 2·5 per cent., were found to be colour-blind, a proportion which has been found to exist elsewhere in the same class of boys, and about half that which exists in the uneducated classes. The following table shows the nature of the chromatic defect, and the condition of the eyesight and the colour of the hair and iris.

No.	Age	Colour of Hair	Colour of Eyes	Colour-blindness	Test type	Test type	Astigmatism.
					No. 1	No. 10	
					in.	ft	
1	12—8	{ Golden } { (fair red) }	Dark grey .	Red-blind .	16	11	Horizontal
2	12—4	Dark brown.	Light blue .	Red-blind .	18	7	Vertical
3	14—1	Dark brown	Blue . . .	Red-blind .	18	4	
4	15—4	Red . . .	Grey . . .	Red-blind .	18	8	Horizontal
5	16	Black . .	Dark brown	Red-blind .	16	8½	Horizontal
6	17	{ Dark golden } { (red) . }	Dark blue .	Red-blind .	17	10	Horizontal
7	17—3	Dark brown.	Blue . . .	Red-blind .	21	13	Vertical
8	14—2	Dark brown.	Light brown	Green-blind	15	7	Horizontal
9	14—3	Red . . .	Blue . . .	Green-blind	29	15	
10	14—11	Red . . .	Grey . . .	Green-blind	20	9	Vertical
11	16—2	Dark brown.	Light blue .	Green-blind	19	12	
12	17—0	Black . .	Light brown	Violet-blind	22	12	
13	18	Light brown	Blue . . .	Imperfect .	16	6	
14	17—4	Brown . .	Grey . . .	Imperfect .	18	7	
15	28	Dark brown.	Light brown	Imperfect .	28	13	Horizontal

Having observed in my private examinations that colour-blindness was very frequent in persons with red hair, Mr. Preston has furnished me with the colour of the hair in his cases. The Table of the relative prevalence of different coloured hair published in the Anthropometric Committee's Report for 1880 shows that red hair prevails in the professional classes (in which are included the Marlborough boys) to the extent of 9·06 per cent., while in conjunction with complete colour-blindness in the above Table it exists to the extent of 41·7 per cent. Light-coloured eyes are slightly in excess, and imperfect eyesight is more prevalent among the colour blind, but the number of observations is too few to form any safe conclusion on these heads.

EYESIGHT.—The following Tables show the quality of the eyesight as tested by Snellen's test-types.

NEAR VISION.—The Distance at which Test-type No. 1 can be read.

Dis- tance in inches	Marlborough Boys.									Masters.		Total.	Per cent.
	Age last Birthday.									Age.			
	11	12	13	14	15	16	17	18	19	20-40	40-50		
0	—	—	—	—	—	—	—	—	—	—	1	1	.2
4	—	—	—	—	1	1	—	—	—	—	—	2	.3
6	—	—	—	1	1	2	—	1	1	—	1	7	1.1
8	—	—	—	1	1	2	2	—	—	—	—	6	1.0
10	—	2	1	4	2	1	3	—	—	—	—	13	2.2
12	1	1	3	4	5	6	2	—	—	2	1	25	4.1
14	1	6	5	6	9	5	1	1	—	—	—	34	5.7
16	3	4	13	14	17	11	6	2	—	1	—	71	11.8
18	2	4	14	17	24	12	7	1	—	3	—	84	14.0
20	2	6	15	27	30	21	14	2	1	2	1	121	20.2
22	1	2	12	19	21	16	9	4	2	—	1	87	14.5
24	1	—	8	18	14	22	11	5	—	1	—	70	11.7
26	—	—	1	6	11	8	3	4	1	4	—	38	6.3
28	—	—	2	3	8	8	4	1	—	3	—	24	4.0
30	—	—	—	1	2	4	1	2	—	2	—	12	2.0
32	—	—	—	—	1	2	—	—	—	—	—	3	.5
34	—	—	—	1	—	—	—	—	—	—	—	1	.2
36	—	—	—	—	—	—	1	—	—	—	—	1	.2
Total	11	25	69	117	142	121	64	23	5	18	5	600	100.
Average	18.4	16.4	18.3	19.0	19.1	20.1	20.0	21.8	19.0	—	—	—	—
	17.7			19.4			20.2			22.1	11.4	—	—

DISTANT VISION.—The distance at which Test-type No. 10 can be read.

Dis- tance in feet.	Marlborough Boys.									Masters.		Total	Per cent.
	Age last Birthday.									Age			
	11	12	13	14	15	16	17	18	19	20—40	40—50		
1	—	—	—	—	—	2	—	1	1	—	1	5	.8
2	—	—	—	4	6	6	5	—	—	2	—	23	3.8
3	—	—	2	3	5	8	1	2	—	1	—	22	3.7
4	—	—	—	—	2	5	3	—	1	1	1	13	2.0
5	—	—	—	1	3	4	1	—	—	—	—	9	1.5
6	—	—	2	4	4	2	3	2	—	—	—	17	3.0
7	1	1	3	4	3	2	—	—	—	1	—	15	2.5
8	1	5	6	5	5	6	3	—	—	—	1	32	5.2
9	—	3	9	9	10	10	3	3	—	—	—	47	8.0
10	2	4	9	15	17	8	5	—	—	1	1	62	10.3
11	2	2	14	17	28	16	14	2	—	—	—	95	15.8
12	2	7	10	17	17	12	9	4	—	2	—	80	13.3
13	3	3	6	15	16	13	3	1	3	4	1	68	11.3
14	—	—	5	8	14	9	4	2	—	2	—	44	7.3
15	—	—	2	10	4	8	4	—	—	—	—	28	4.7
16	—	—	1	2	4	6	4	4	—	—	—	21	3.5
17	—	—	—	1	3	2	1	1	—	1	—	9	1.5
18	—	—	—	—	1	1	—	—	—	1	—	4	.7
20	—	—	—	—	—	—	—	—	—	1	—	1	.2
22	—	—	—	1	—	—	—	—	—	—	—	1	.2
Total.	11	25	69	117	142	121	64	23	5	18	5	600	100
Average.	10.0	9.4	9.5	10.0	9.6	9.1	9.4	10.2	8.0	—	—	—	—
	9.6			9.6			9.2			10.5	6.5	—	—

Judging by the averages it would seem that the near sight (as tested by No. 1) improves from year to year up to 40, but this apparent improvement is probably due to the greater ease with which the type is read by the elder pupils and masters. From the great distances at which the No. 1 type has been read, it is probable that considerable efforts have been made to distinguish it at the greatest possible distance rather than at the distance at which it could be read with ease and fluency. The curve formed by the whole number of observations at all ages is remarkably uniform, the 'mean' being at 20 inches, and the corresponding groups above and below the mean being nearly identical in value. Normal near vision exists in 51.7 per cent., while 39.4 are above, and 8.9 per cent. below the average.

The averages do not show any change in the distant vision (as tested by No. 10) up to the age of 40 years, a result which contrasts favourably with

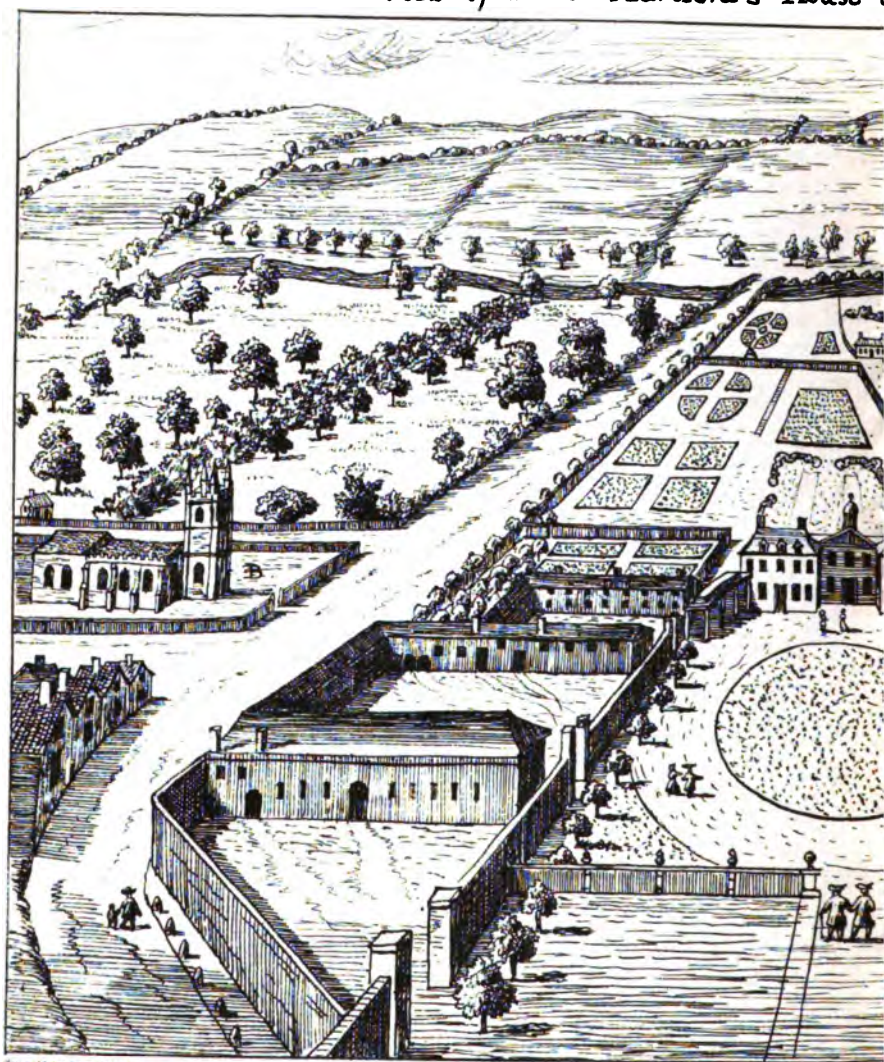
similar observations made in German schools and universities, where short-sight has been found to increase rapidly with the extended period of education. The curve formed by the total number of observations is, however, irregular, and consists of two curves having a chief mean at 10—11 feet, and a minor one at 2—3 feet. This latter curve is due to the accession after the age of 13 years of an abnormal amount of imperfect eyesight (short-sight and over-sight) which is too slight relatively to the total number of observations to influence the averages. 39·4 per cent. possess normal distant vision, while 30·1 per cent. are above, and 30·5 per cent. below the average.

ASTIGMATISM.—Tested by means of the letters composed of horizontal and vertical lines, 68·2 per cent. of the Marlborough boys and masters are returned as more or less astigmatic, or in the proportion of nearly two to one; the ratio of the horizontal to the vertical defect being 1 to 1·2. Mr. Preston is not quite satisfied with the result of his observations on this subject, as he had no means of checking the statements of the boys.

IGNORANCE OF THE NAMES OF COLOURS.—In a recent report on the examination of 27,927 school-children for colour-blindness by Dr. Joy Jeffries, in America, the following remarks on this subject occurs: 'Experience has abundantly shown me that but very few boys of the grammar or higher schools are familiar with colour-names of even the primary colours, and that still less can they correctly apply those names they do remember when shown coloured objects. Although prepared for this ignorance on the part of the boys to a certain extent, I confess I was astonished to find it so frequent and great. It seems almost impossible that a bright boy of fourteen, not colour-blind, should not know the word *green* or be able to apply it. Yet, this does not give an extreme idea of the truth in reference to the ignorance of colour-names and their application among school-boys' Being desirous to know if our English public schoolboys are as ignorant of colour-names and their application as the boys of the same class in America, I submitted the above sentence to Mr. Preston, and the following is his reply: "I cannot agree with Dr. Jeffries as to ignorance of colour-names. By this I mean reds, greens, &c. Of course *mauve*, *magenta*, &c., and what are called drapers' colours are not often known, but I have certainly had no difficulty in getting the names of the common colours. In fact it was quite the exception to meet with a boy who could not tell the names fairly well. The whole of the boys who proved to be colour-blind, except one, knew of their defect, and another boy was under the impression that he was colour-blind, but turned out on examination not to be so."

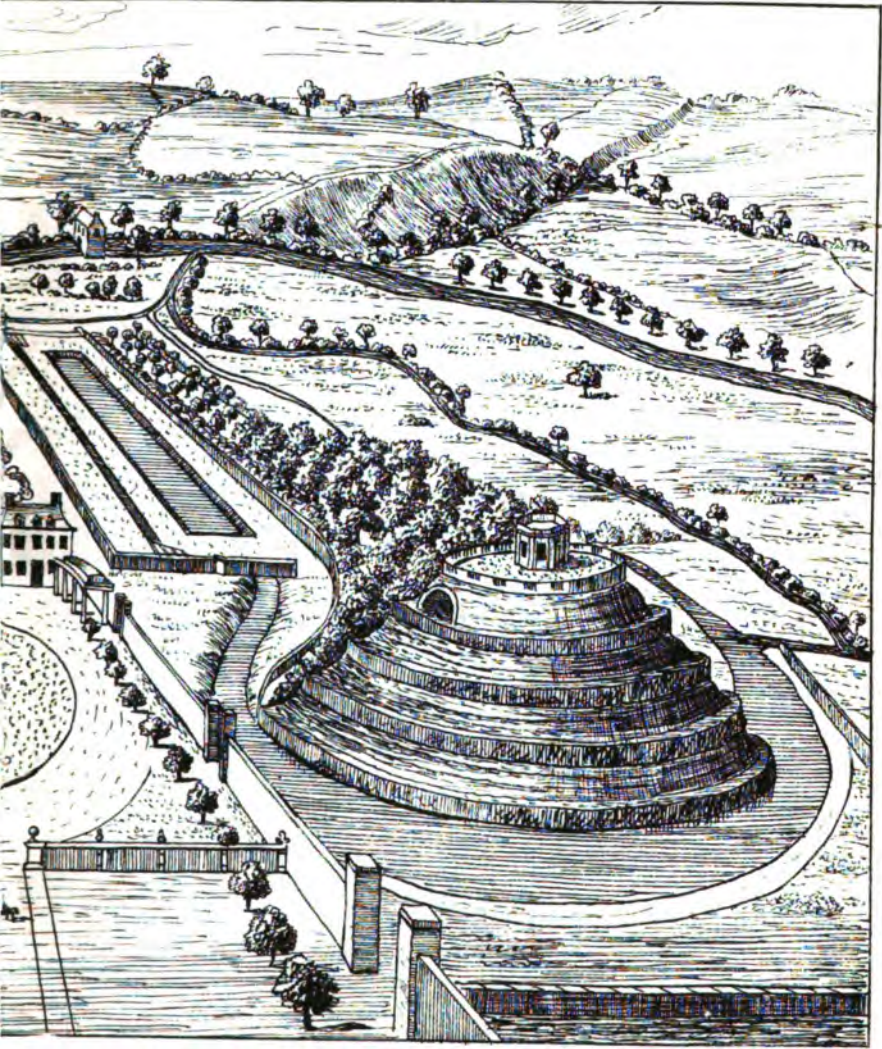
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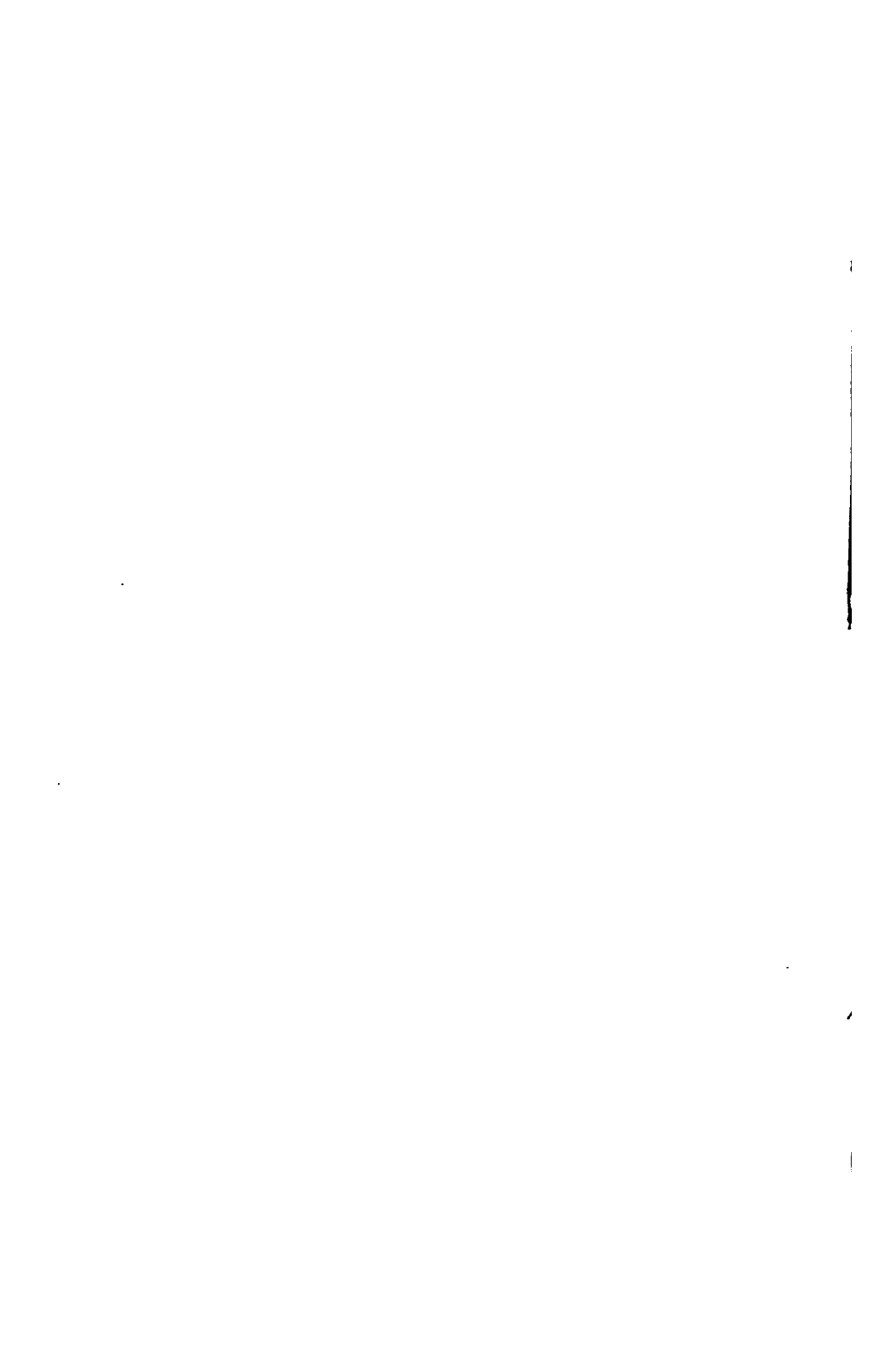
View of Lord Hartford's House



Cornell & Anderson Sculp.
1784

at Marlborough 29 Jun 1723 At the Site of the Roman Castrum.





REPORT

OF THE

MARLBOROUGH COLLEGE

MARLBOROUGH + COLLEGE Natural History Society.

—
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—

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Feb. 2—"Cards and Card Playing,"

W. J. FORD, Esq.

Feb. 16—"A Trip to the Desert,"

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Sat., Mar. 4—"Rotifers" (with illuminated
diagrams). C. T. HUDSON, Esq.

Mar. 16—"From Carthaginians to Corsairs,"

REV. J. P. WAY.

Mar. 30—"Some great Naturalists,"

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Society,

1864),

A.S., 1882.



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J. S. Wilson
 E. K. Chambers
 W. H. Rotheram
 P. Horton-Smith
 G. T. K. Maurice
 D. Bowly
 T. Zachary
 C. E. Cooper
 C. H. Lance
 H. A. Clark
 F. G. Casson
 D. M. Wauchope
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 H. G. Elton
 A. J. Badcock
 S. H. Reynolds
 H. C. B. Foyster
 M. S. Prichard
 R. T. Michell
 J. M. Elles
 J. A. Hay
 W. L. Wainwright

SATURDAY.

V. E. Barrow
 G. A. H. C. Berkeley
 E. J. Teesdale
 W. B. Price
 A. E. R. Mangles
 H. Dobie
 W. B. Silver
 F. C. Ford
 F. E. Drummond-Hay
 C. C. Erichsen
 B. C. W. Williams
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864),

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REPORT

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Natural History Society,

(FOUNDED APRIL 9th, 1864),

FOR THE

YEAR ENDING CHRISTMAS, 1882.

No. 31.



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1883.

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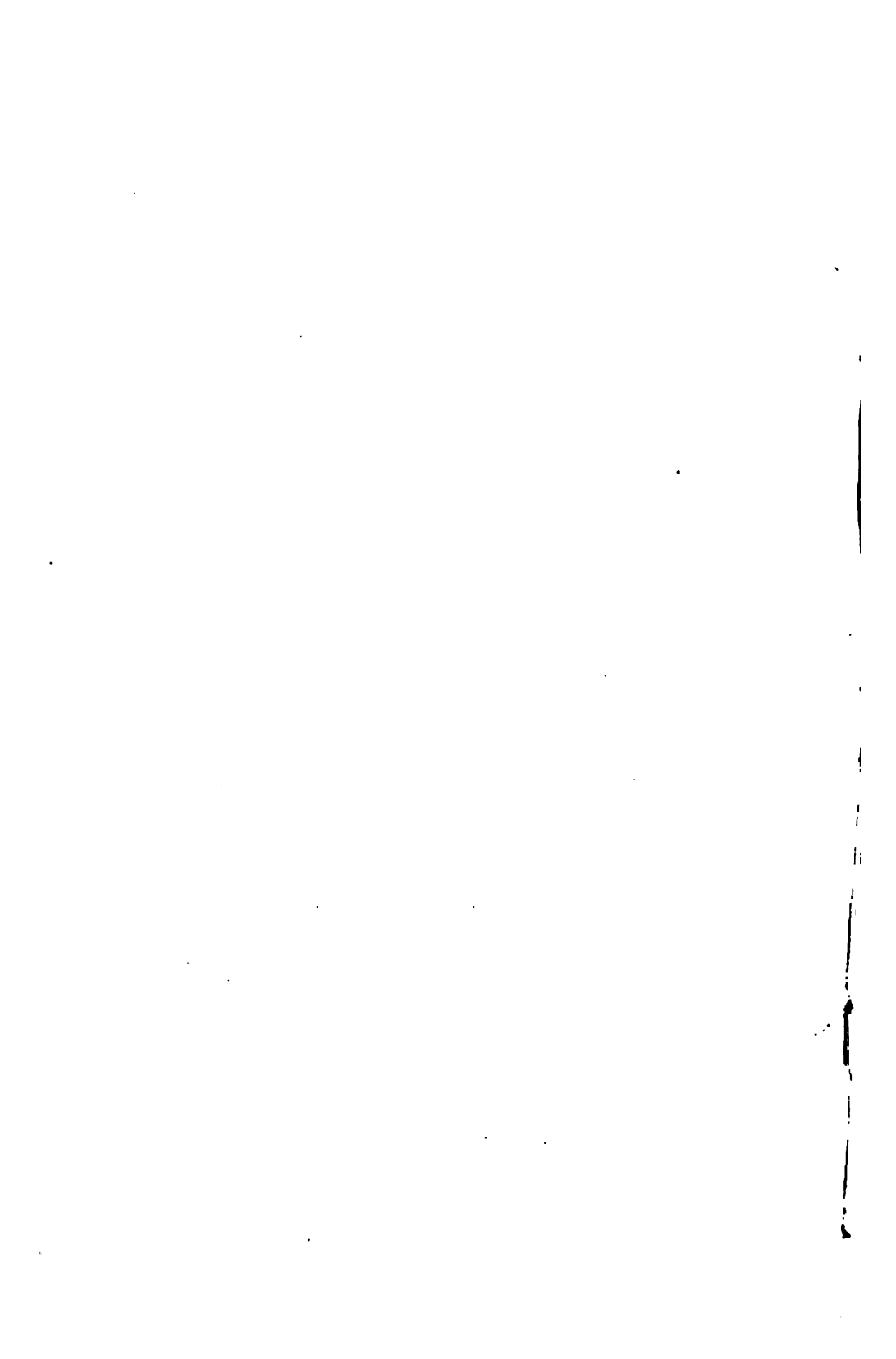
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PREFACE.

THE President and Committee regret that in offering to their friends and subscribers the Report of the work of the Natural History Society during the year 1882, they cannot point to any marked sign of progress.

Sections.

The sectional work has not been carried on with any real vigour, or interest. The Botanical section has died, at any rate for the present, from want of support. The Ornithological section under the guidance of the Rev. J. P. WAY, suspended its sittings temporarily when the egg-laying season was over, and the same course was adopted by the Entomologists under the Rev. T. N. HART-SMITH, as soon as the collections for the Stanton Prizes had been shown up. The Astronomical section has enjoyed an intermittent existence owing to exceptional circumstances. Meetings have been held irregularly, and the telescope has been used to some extent. The favourable condition of the atmosphere enabled a considerable number to observe the Transit of Venus with some success. Taken as a whole we are compelled to admit that the sectional work of this year has been, compared with last year, a failure. We acknowledge it with regret, as it is the only approach to scientific teaching at which the Society can aim. If the members show any real desire to take advantage of their opportunities in the coming year, the Committee will do their best to meet their views. Through-

out the year the "Microscopic" meetings in Mr. HART-SMITH'S room have been continued.

**Stanton
Prizes.**

The competition for the Stanton Prizes has again been disappointing. If we could believe that the time that might with advantage have been devoted to this class of work had been given to ordinary school work, we should cheerfully accept the fact, but we cannot but think that with a little more system, the necessary time that these prizes require might have been found, and the ordinary school work have still suffered no hurt: we regret the feebleness of the attempt, not from any personal feeling of failure, but because we know that those who have put their hand to the plough and turned back have lost a chance which in later life they will probably be sorry for. In the Geological department there was but one candidate, E. K. CHAMBERS, who won the Botanical Prize last year; for the Botanical Prize also there was but one competitor, R. W. RICKARDS, and he was disqualified for showing up his collection too late. The field for the Entomological Prize, which was a fair one at the start, gradually dwindled down as one after another became faint-hearted, till in the end only two—E. F. BENSON and H. DOBIE—were in the running. The prize was awarded to the former, although his setting left much to be desired. The subjects for 1883 are more attractive than usual, and for the aid of the Society as well as for the advantage of individuals, we hope that our next Report will contain a record of better things. A Prize offered to the Entomological section for drawings to show the resemblance between plants and the creatures that feed upon them, produced twelve good diagrams by W. H. ROTHERAM.

Lectures.

The increase in the attendance at the fortnightly papers, which was visible last year, has been fully maintained this year. We have received assistance from various quarters, which has been very welcome, and the magic lantern has been brought into use, and has been ably worked by Mr. BAVERSTOCK. The two

lectures by Dr. HUDSON, of Clifton, proved a great success, and did something, we trust, to raise the opinions sometimes held on the subject of Natural History. The most encouraging feature perhaps of the year's work is the paper read by G. T. K. MAURICE, on "Personal Experiences in Ornithology," which furnishes an admirable example of the way in which we should like to see more members of the Society deal with the subjects which they have selected to study.

The new Museum buildings are rapidly progressing. The arrangement of the collections has been entrusted to the Rev. T. A. PRESTON, who after consultation with the best authorities, has elaborated a scheme which we feel confident will meet with general approval. It is gratifying to know that the work which has been done in the past is so far appreciated by the Council and their advisers, that they have decided to spare no necessary expense in furnishing the best and most complete internal fittings. The expenditure incurred is very heavy, but we believe that the result will be considered adequate: and that we shall possess a Museum such as no other school in England can boast. We shall be disappointed if the Society does not show its appreciation of such liberality by renewed vigour and thoroughness.

New
Museum.

The Report will be found to contain all the ordinary matter. The Report. We would especially call attention to a valuable paper by G. W. RUNDALL, Esq., on Fortification, which, clear as it is, is rendered still more intelligible by the diagram which accompanies it. The frontispiece is an admirable copy, by the President of the Art Society, of a curious old engraving in the Adderley Library of what C House once was. We intend this to be the first of a series of views of the Town and College, as they were in the past: believing that if preserved as a series they will prove of considerable interest to all Marlburians. The hand of F. E. HULME, Esq., will be at once recognised in the drawings which illustrate his paper on

"Unnatural History." We have also printed the list of past winners of the Stanton Prizes.

**Rearrange-
ment of
Collections.**

We have employed Mr. S. L. MOSLEY, of Huddersfield, to transfer the moths and butterflies from the old cabinet to the new one, to arrange the Meyrick collection of beetles, supplemented by other contributions, to the old cabinet, and to set out our collection of eggs in a way which he has himself devised. The work has been thoroughly well done, and although it has been a heavy drain on our resources, we feel sure that all will allow that the money has been well spent. Not only are these collections now beautiful to the eye, but they will furnish a useful model for private collectors.

**Map of the
Downs.**

The first proof of the Map of the Downs by the Rev. A. C. SMITH, of Yatesbury, has appeared, and will add considerably to the knowledge of the neighbourhood. To encourage such knowledge the Society this summer offered a prize for the best acquaintance with the district, which was won by B. S. COLLETT, whose note book and paper displayed a large amount of careful and useful research.

Donations.

As usual, our property has been increased by presents from all quarters. The Society having been placed on the list of societies entitled to receive specimens from the British Museum, and from Kew, Mr. PRESTON has been enabled to make very valuable selections from both places, and to secure several series of typical collections, which can now be advantageously exhibited in the increased space furnished by the new buildings. E. F. IM THURN, Esq., O.M., has already sent the first instalment of what promises to be a large assortment of objects from British Guiana, and the School has been enriched by a costly and gigantic case of birds, set up by the first house in London. The birds are a selection from those shot in Central Asia by one of the most distinguished of Old Marlburians, the well known traveller, R. B. SHAW, who died in harness not long ago. They are munificently presented to us by his sister

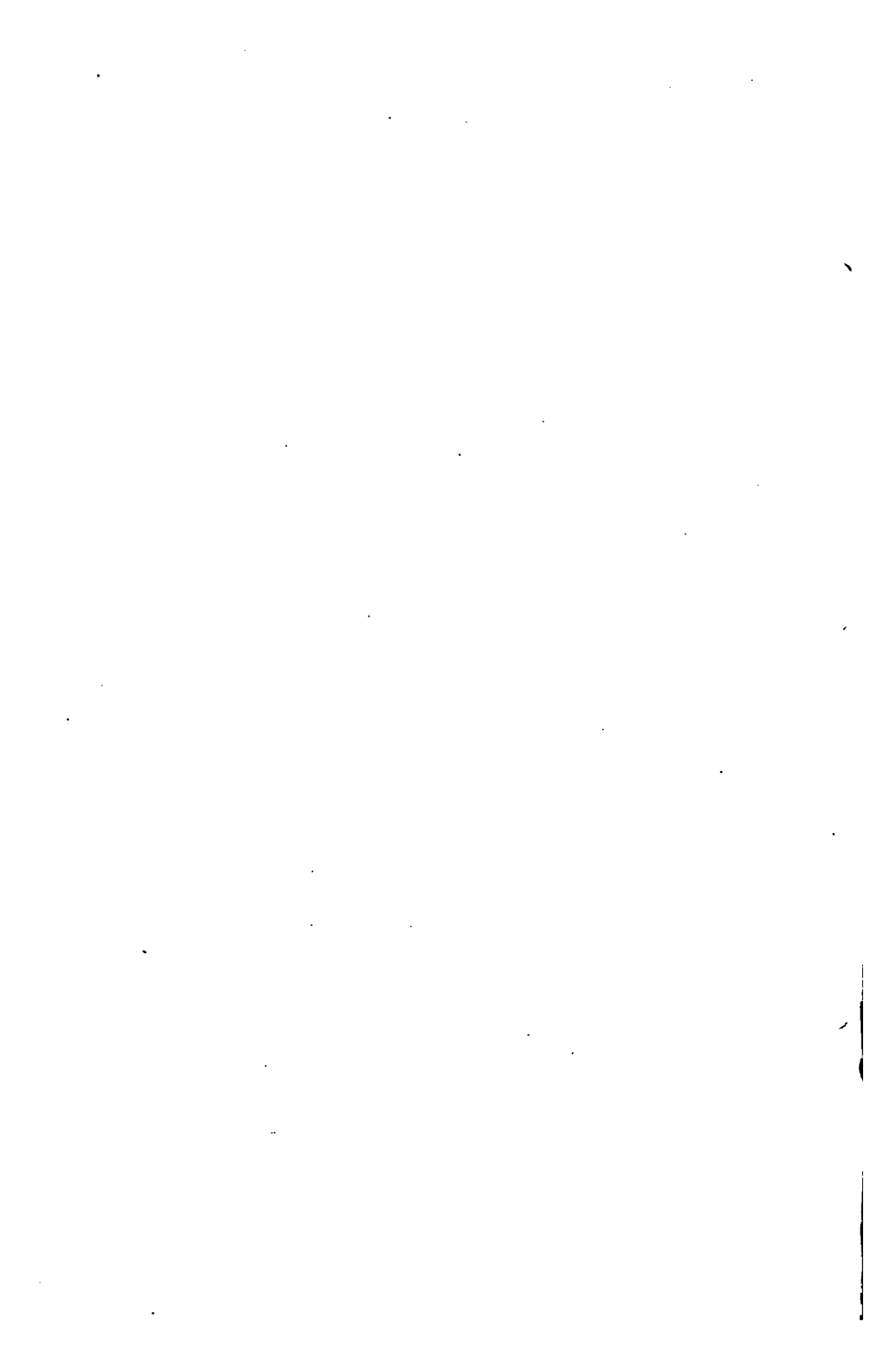
Mrs. YOUNGHUSBAND, who was anxious that there should be some lasting memorial here of her brother's affection for his old school.

Signed, on behalf of the Committee,

H. RICHARDSON,

President.

CHRISTMAS, 1882.



MEMBERS.

LENT TERM, 1882.

President :

H. Richardson, Esq.

Committee :

G. F. Rodwell, Esq.
F. S. Alston.

Rev. T. N. Hart-Smith.
E. N. Gardiner.

Treasurer :

Rev. J. P. Way.

Secretary :

P. H. Maddock.

Sections.

Ambulance Classes.

J. S. Wilson
E. K. Chambers
W. H. Rotheram
P. Horton-Smith
G. T. K. Maurice
D. Bowly
T. Zachary
C. E. Cooper
C. H. Lance
H. A. Clark
F. G. Casson
D. M. Wauchope
H. R. Robertson
B. T. A. Hughes
H. G. Elton
A. J. Badcock
S. H. Reynolds
H. C. B. Foyster
M. S. Prichard
R. T. Michell
J. M. Elles
J. A. Hay
W. L. Wainwright
V. E. Barrow
G. A. H. C. Berkeley
E. J. Teesdale
W. B. Price
A. E. R. Mangles
H. Dobie
W. B. Silver
F. C. Ford
F. E. Drummond-Hay
C. C. Erischen
B. C. W. Williams
G. S. Back
C. H. Lambert
H. F. Nicholson
G. Mahon
H. V. Thomson
W. G. L. Beynon
F. J. Danvers
H. E. Clark
W. E. Hardy
J. E. Dean

Entomological.

Rev. T. N. HART-SMITH
P. H. MADDOCK
F. S. Alston
W. F. H. Blandford
G. A. H. C. Berkeley
P. Horton-Smith
A. P. Pervical
H. Dobie
B. T. N. Berkeley
P. M. C. Coats
W. H. Coats
W. H. Rotheram
C. R. Lias
W. B. Price
E. J. Teesdale
F. E. Stiffe
E. A. Stanton
W. L. Wainwright
J. J. Wright
E. E. de Satgé
J. A. Hay
F. N. Ellis

Astronomical.

G. F. RODWELL, Esq.
L. E. UPCOTT, Esq.
H. L. CALLENDAR
E. K. Chambers
B. G. Usher
F. W. Yeates
E. A. Molony
G. J. Elliot
E. A. Kirkpatrick
C. H. Roberts
N. S. de Jersey
L. Jenner
H. F. Nicholson
W. F. H. Blandford
A. C. Crommelin
C. E. Dupuis
G. Mahon
L. W. Browne
H. V. Thomson
J. P. Gamon

Ornithological.

Rev. J. P. WAY
R. K. CARDEW
C. E. Cooper
H. G. Berwick
G. S. Back
G. T. K. Maurice
R. W. Rickards
E. B. Dawson
T. Zachary
H. West
H. R. Cooper
H. L. Stanton
W. F. Cholmeley
L. C. Hamerton
H. W. Cholmeley
E. F. Everett

Ordinary Members.

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H. G. Goodacre
E. Pedder
H. C. Bucknall
P. E. Bucknall
H. M. Prescott
P. H. Cannon
A. M. Fairbairn
A. L. Jackson
E. B. Badcock
R. W. Rickards
F. Bligh
H. G. Hills
G. Heaton
A. E. R. Mangles
B. S. Collett
A. B. Field
N. W. Logan
A. S. Berwick
H. H. G. Stansfeld
F. J. E. Powles
C. N. R. Batty
C. G. Green
R. D. Preston

SUMMER TERM, 1882.

President :

H. Richardson, Esq.

Committee :

G. F. Rodwell, Esq.
E. N. GardinerRev. T. N. Hart-Smith
H. L. Callendar

Treasurer :

Rev. J. P. Way.

Secretary :

P. H. Maddock

Sections.

Ornithological.

Rev. J. P. WAY
R. K. CARDEW
C. E. COOPER
G. S. BACK
G. T. K. MAURICE
E. B. DAWSON
H. B. COOPER
G. A. C. SIM
J. A. HAYWARD
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C. HARTLEY
E. B. WOOD
V. E. BARROW
W. B. SILVER
P. HORTON-SMITH
G. E. BLUNDELL

Entomological.

Rev. T. N. HART-SMITH
P. H. MADDOCK
W. F. H. BLANDFORD
G. A. H. C. BERKELEY
A. P. PERCIVAL
H. DOBIE
R. T. N. BERKELEY
P. M. C. COATS
W. H. COATS
W. H. ROTHERAM
C. R. LIAS
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A. F. E. STIFFE
E. A. STANTON
W. L. WAINWRIGHT
J. J. WRIGHT
E. E. de SATGÉ
E. F. BENSON
L. C. HAMERTON
H. F. DARELL-BROWN

Astronomical.

G. F. RODWELL, Esq.
L. E. UPCOTT, Esq.
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E. K. CHAMBERS
F. W. YEATES
E. A. MOLONY
G. J. ELLIOT
C. H. ROBERTS
N. S. de JERSEY
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W. F. H. BLANDFORD
C. E. DUPUIS
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H. V. THOMSON
J. P. GAMON
F. E. ROWE
W. F. CHOLMELEY
H. W. CHOLMELEY
S. H. REYNOLDS
A. G. THYNNE
H. G. COMBER

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J. E. WEBB-WARE
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H. M. GIVEEN
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H. G. COMBER
E. W. M. MEERES

WINTER TERM, 1882.

President :

R. Richardson, Esq.

Committee :

G. F. Rodwell, Esq.
E. N. GardinerRev. T. N. Hart-Smith
C. H. Roberts

Treasurer :

Rev. J. P. Way

Secretary :

W. F. H. Blandford

Sections.

*Entomological.*T. N. HART-SMITH, Esq.
W. F. H. BLANDFORD
G. H. A. C. Berkeley
A. P. Pervical
H. Dobie
W. H. Rotheram
E. A. Stanton
W. L. Wainwright
J. J. Wright
E. F. Benson
L. C. Hamerton
H. F. Darell-Brown
H. L. Bell
A. B. Jackson
F. P. S. Yeatman
E. K. Chambers
G. L. Hildebrand
C. S. Stack*Astronomical.*L. E. UPCOTT, Esq.
C. H. ROBERTS
E. K. Chambers
C. J. Elliot
H. F. Nicholson
L. W. Browne
H. V. Thomson
F. E. Rowe
J. P. Gamon
H. W. Cholmeley
E. J. Teesdale
E. L. ProcterP. E. Bucknall
W. J. Hemsley
H. L. Bell
R. T. M. Berkeley
L. C. W. Bullock
J. M. Harvey*Ordinary Members.*H. G. Goodacre
F. W. Yeates
G. S. Back
E. A. Molony
C. H. Lance
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H. C. Bucknall
P. Horton Smith
H. A. Clark
H. R. Cooper
H. C. B. Foyster
G. A. C. Sim
A. M. Fairbairn
A. L. Jackson
P. M. C. Coats
W. H. Coats
R. W. Rickards
E. B. Badcock
E. B. Dawson
F. Bligh
J. A. Hayward
R. T. Michell
C. G. Chambers
J. A. HayH. G. Hills
A. F. E. Stiffe
A. E. R. Mangles
B. S. Collett
W. B. Silver
A. B. Field
F. J. E. Powles
R. D. Preston
H. L. Stanton
C. H. Lambert
F. J. Danvers
W. R. MacInnes
W. A. Clowes
C. G. Green
W. C. Lascelles
S. H. Reynolds
G. E. Blundell
G. H. Procter
E. Pemberton
G. H. Bosworth-Smith
A. G. Thynne
J. E. Webb-Ware
F. H. Hulme
C. S. Palmer
W. A. King-Harman
E. W. M. Meeres
F. N. Ellis
H. G. Comber
R. N. Harvey
H. W. Edwards
R. Waddilove
B. C. Waterfield
C. S. Stack

HONORARY MEMBERS.

Rev. T. A. Preston	H. J. Verrall, Esq.
F. E. Thompson, Esq.	C. W. Bourne, Esq.
W. E. Mullins, Esq.	H. D. Drury, Esq.
Rev. J. Sowerby	Rev. C. Soames
The Dean of Westminster	H. P. Dixon, Esq.
C. M. Bull, Esq.	W. A. Clarke, Esq.
W. Fergus, Esq., M.D.	Rev. W. M. Furneaux
S. B. Dixon, Esq., F.G.S.	Rev. A. C. Smith
W. H. Macdonald, Esq.	J. B. Fuller, Esq.
W. Mansell, Esq.	H. E. Garrod, Esq.
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G. H. Dawson, Esq.	W. W. Goodchild, Esq.
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E. F. im Thurn, Esq.	W. M. H. Milner, Esq.
Rev. G. W. de Lisle	Rev. T. N. Hart-Smith
H. A. Evans, Esq.	Rev. J. P. Way
Rev. J. W. Mills	H. Richardson, Esq.
W. W. Fowler, Esq.	Rev. C. W. Taylor
A. H. Beesly, Esq.	Rev. J. Papillon
F. E. Hulme, Esq.	H. B. Horner, Esq.
Rev. C. E. Thorpe	G. Sharp, Esq.
Rev. J. S. Thomas	G. W. Rundall, Esq.
Canon Farrar, D.D., F.R.S.	R. Alford, Esq.
W. P. Sellick, Esq.	F. Madan, Esq.
H. C. Spry, Esq.	Rev. W. J. V. Baker
G. F. Rodwell, Esq.	J. Bain, Esq.
W. D. Fenning, Esq.	B. D. Turner, Esq.
R. E. Price, Esq.	

EXTRACT FROM RULES.

That Honorary Members pay 5s. a half-year, for which they shall be entitled to a copy of the Report.

That Honorary Members may compound for all future subscriptions by the payment of Three Guineas, and that past members of the Society may compound for six years on payment of £1, to be renewed at will.

R U L E S .

1. That this Society be called the Marlborough College Natural History Society.

CONSTITUTION.

That the Society consist of Members and Honorary Members.

OFFICERS.

That the Officers of the Society consist of a President, Secretary, Treasurer, Librarian, and Curator.

ELECTION OF OFFICERS.

1. That the President have the absolute power of nominating the Secretary.

2. That Common Room members of Committee, who are not ex-officio members, be elected triennially at the commencement of the Winter Term, and that the retiring members be eligible for re-election. Candidates for the Committee from the School must be nominated by the Committee, and elected at the end of the term when the vacancy occurs.

3. That the Librarian and Curator be elected terminally by the Committee.

MANAGEMENT.

That the affairs of the Society be conducted by a Committee consisting of the President, Secretary, Treasurer, and four other members of the Society, two of whom, at least shall be members of the School, to be elected from and by members of the Society; three of whom shall form a quorum.

PRESIDENT.

That in case of an equality of votes, the President shall have a double or casting vote.

SECRETARY.

That the duty of the Secretary be to summon meetings (when necessary) of the Society; to keep a detailed report of the proceedings, as well as lists of Members and Visitors present at each meeting, and generally to act under the direction of the Committee in all matters connected with the welfare of the Society.

LIBRARIAN.

That the duties of the Librarian be to keep a Catalogue of the Library, with the names of the donors, and to see that the Library Regulations are carried into effect.

CURATOR.

That the Curator be responsible for the order and tidiness of the Museum.

LIBRARY.

That any member of the Society be at liberty to consult any of the books belonging to the Society, but that certain volumes to be decided on by the Committee be not allowed to be taken from the room.

MUSEUM.

That only certain members be allowed access to the Museum at all times when the room is not used for school purposes. Application for this privilege must be made to the President.

FIELD DAYS.

That the Field Days be confined entirely to members of the Society, and that the President appoint a day on which all names must be given in.

MEMBERS.

That the election of new members rest entirely with the President.

That every member pay a subscription of 2s. 6d. his first term and 1s. every subsequent term.

That members have the right to introduce one visitor at all general meetings of the Society.

This rule does not apply to the President and Secretary.

HONORARY MEMBERS.

That Honorary members pay 5s. a half-year, for which they shall be entitled to a copy of the Report.

That honorary members may compound for all future subscriptions by the payment of three guineas, and that past members of the society may compound for 6 years on payment of £1, to be renewed at will.

SUSPENSION OF MEMBERS.

That any member be liable to be excluded from the Society by the Committee, if in their opinion, he shall have failed to show sufficient energy in the work of the Society.

SECTIONS.

That the Society be divided into sections to be formed for the more accurate study of the different branches of Natural History.

That the question of the number of sections be left open for settlement at the beginning of every Term.

Attendance at the sections is compulsory, unless an adequate reason can be given for exemption.

Attendance at the sections excuses attendance at the general meetings.

NEW RULES.

That any member of the Society have power to propose any new rule or any alteration in an old one for the consideration of the Committee, provided the motion be seconded by another member.

Two weeks notice must be given of any change proposed.

FIELD DAYS, 1882.

SATURDAY, MAY 13TH, PEWSEY VALE.

The party on this occasion numbered 37. They dined at Sunnyhill, and reassembled for tea on Clench Common. The day was exceedingly fine, but there was a cold east wind blowing.

The Entomological section made some good captures. The Orange-tip was flying, and a few moths were taken, Benson being the most fortunate. Beating answered best. Coleoptera were in this way found plentifully, and Blandford took several notices. The Botanical section found 165 plants in flower, of which 27 were first notices, the most unexpected of the new arrivals being *Orchis Ustulata*. Perhaps the most striking point was the great luxuriance of certain flowers, especially the Red Campion and Water Aven. The New Mill district on May 10th last year yielded 146 notices.

The Ornithological section did well. They obtained many notices, and amongst them one of a species of linnet not very common in this district.

SATURDAY, JUNE 3RD, AVEBURY.

After dining in Mr. Kemm's grand old barn at Avebury, the party drove 2 miles further on towards Winterbourne Bassett, and then worked back towards Avebury. Torrents of rain destroyed the hopes of the Entomologist, but enough was seen of this new district to encourage the Ornithologist and Botanist to repeat the visit another year. 142 plants were observed in flower, of which 11 were first notices.

SATURDAY, JULY 1ST, BLACK BURNEY BOTTOM, AND AXFORD.

32 members after lunching on the downs beyond Rabley, worked the valley known as Sound Bottom beyond Mildenhall borders, coming out at Axford, and visiting the water meadows after tea.

Thanks largely to R. W. Rickards 214 plants were observed in flower as against 250 on July 7th of last year. 20 were first notices. The grasses were in unexampled perfection. The Entomologists were not successful mainly owing to the absence of any expert. An earlier visit would probably yield a better result. A third party drove over to Aldbourne and Ramsbury, and paid a visit to those two fine specimens of ecclesiastical architecture.

FRIDAY, SEPTEMBER 29TH, MICHAELMAS DAY, STONEHENGE.

The unusual opportunity of a long day's freedom in the absence of school after 11 o'clock, led to the innovation of a Field Day in the winter term, and a party of 12 drove in 2 hours to Netheravon, 14 miles, then walked to Stonehenge $4\frac{1}{2}$ miles and back, prolonging the stroll along the banks of the Avon to Rushall, where the carriage was rejoined, and home was reached before 8 o'clock. Lunch was taken en route, and a meat tea prepared at the "Dog and Gun," Netheravon, on their return. The day was a grand one for this time of the year, and the whole expedition was a thorough success. 180 plants and grasses were observed in flower, including an abundance of *Adonis Autumnalis*.

LESSER FIELD DAYS.

Other smaller field days were also undertaken during the summer term by the different sections, in which the holiday element being less prevalent better work was done than is sometimes the case on the larger expeditions. Amongst others a party of Geologists went over to Swindon by train and worked in the cutting just beyond Old Swindon Station with some success.

MEETINGS.

THURSDAY, JANUARY 26TH, PRELIMINARY.

After the sectional work had been organized several donations were exhibited; the most interesting being a brick from Sepharvaim stamped with the name of King Nebuchadnezzar, presented by the well known explorer, H. Rassam, Esq.; some weapons in use among the northern tribes of British India from H. C. Spry, Esq., O.M.; and the head of the fox killed by the Tedworth hounds in the school court last Christmas, given by C. M. Bull, Esq.

THURSDAY, FEBRUARY 2ND.

The PRESIDENT in the chair.

A paper was read by W. J. FORD, Esq., on

CARDS AND CARD PLAYING.

Present: Members 51; School 53; Common Room 6; total 110.

THURSDAY, FEBRUARY 16TH.

The PRESIDENT gave an account of a

JOURNEY FROM CONSTANTINE TO BISKRA,

which he had undertaken last Christmas, and which was illustrated by a large display of photographs.

Present: Members 45; School 34; Common Room and Friends 11; total 90.

SATURDAY, MARCH 4TH.

DR. HUDSON of Clifton gave a lecture on

ROTIFERS

to a crowded audience. An account of which will be found in the *Marlburian* of March 15th.

SATURDAY, MARCH 18TH.

The REV. J. P. WAY gave an account of his recent visit to
ALGERIA AND TUNIS,
which was illustrated by a good display of photographs.

Present, members 33, school 31, Common Room and friends 9. Total,
73.

SATURDAY, MARCH 30TH.

O. ELTON, Esq., O.M., C.C.C., Oxford, read a paper on
THE LIFE OF LINNÆUS.

The record of the numbers present has been mislaid.

SUMMER TERM.

THURSDAY, MAY 3RD. PRELIMINARY.

H. L. CALLENDAR, senior prefect, was elected on to the Committee,
vice F. S. Alston, who had left.

THURSDAY, MAY 11TH.

H. M. ELDER, Esq., O.M., Trinity College, Cambridge, read a paper on
PHOTOGRAPHY,

which will be found on page 33 of this Report, and next day took some very
successful photographs, which were exhibited at a meeting of the Art Society.

Present, members 42, school 32, Common Room and friends 10. Total,
84.

THURSDAY, MAY 25TH.

G. T. K. MAURICE, read a paper on

PERSONAL EXPERIENCES IN ORNITHOLOGY,
which will be found on page 25 of this Report.

Present, members 44, school 43, Common Room and friends 8. Total, 95.

THURSDAY, JUNE 8TH.

A. H. BEESLY, Esq., read a paper on

ARCTIC EXPLORATION,

and which will be found on page 42 of this Report, which was illustrated with the help of the Magic Lantern; the first time that Mr. DeLisle's gift to the Society has been used.

The Bradleian was filled by an audience of about 200.

THURSDAY, JUNE 22ND.

F. E. HULME, Esq., read a second paper on

UNNATURAL HISTORY,

which will be found on page 54 of this Report, and illustrated it by many drawings on the black board, four of which are reproduced in this Report.

Present, members 29, School 23, Common Room and friends 3. Total, 58.

WINTER TERM.

THURSDAY, SEPTEMBER 21st. PRELIMINARY.

W. F. H. Blandford and G. H. Roberts, were elected on the Committee in place of P. H. Maddock and H. L. Callendar, who had left. Four Candidates for the two vacancies were duly proposed and seconded.

THURSDAY, SEPTEMBER 28TH.

L. E. UPCOTT, ESQ., gave a lecture on

ELEMENTARY ASTRONOMY.

which was illustrated by several diagrams prepared by the Treasurer of the Society, and the President of the Art Society.

Present, members 39, School 24, Common Room and friends 11. Total 74.

THURSDAY, OCTOBER 12TH.

The REV. T. N. HART-SMITH read a paper on

AN INSECT'S MOUTH UNDER THE MICROSCOPE,

with the help of a Magic Lantern, kindly lent and worked by Mr. Baverstock. The lecture was illustrated by means of slides, some displaying photographs from life, and other drawings skilfully prepared for the purpose by the lecturer, Rev. W. J. V. Baker, and W. H. Rotheram.

Present, members 38, School 32, Common Room and friends 12. Total 82.

THURSDAY, OCTOBER 28TH.

G. W. RUNDALL, ESQ., read a paper on

FORTIFICATION,

which will be found on page 71 of this Report. It was abundantly illustrated by diagrams, and drawings, and models prepared expressly by the Rev. W. J. V. Baker, and Mr. Baverstock.

Present, members 55, School 71, Common Room and friends 15. Total 141.

THURSDAY, NOVEMBER 9TH.

The REV. T. A. PRESTON, gave a lecture in the Museum on

THE FROG,

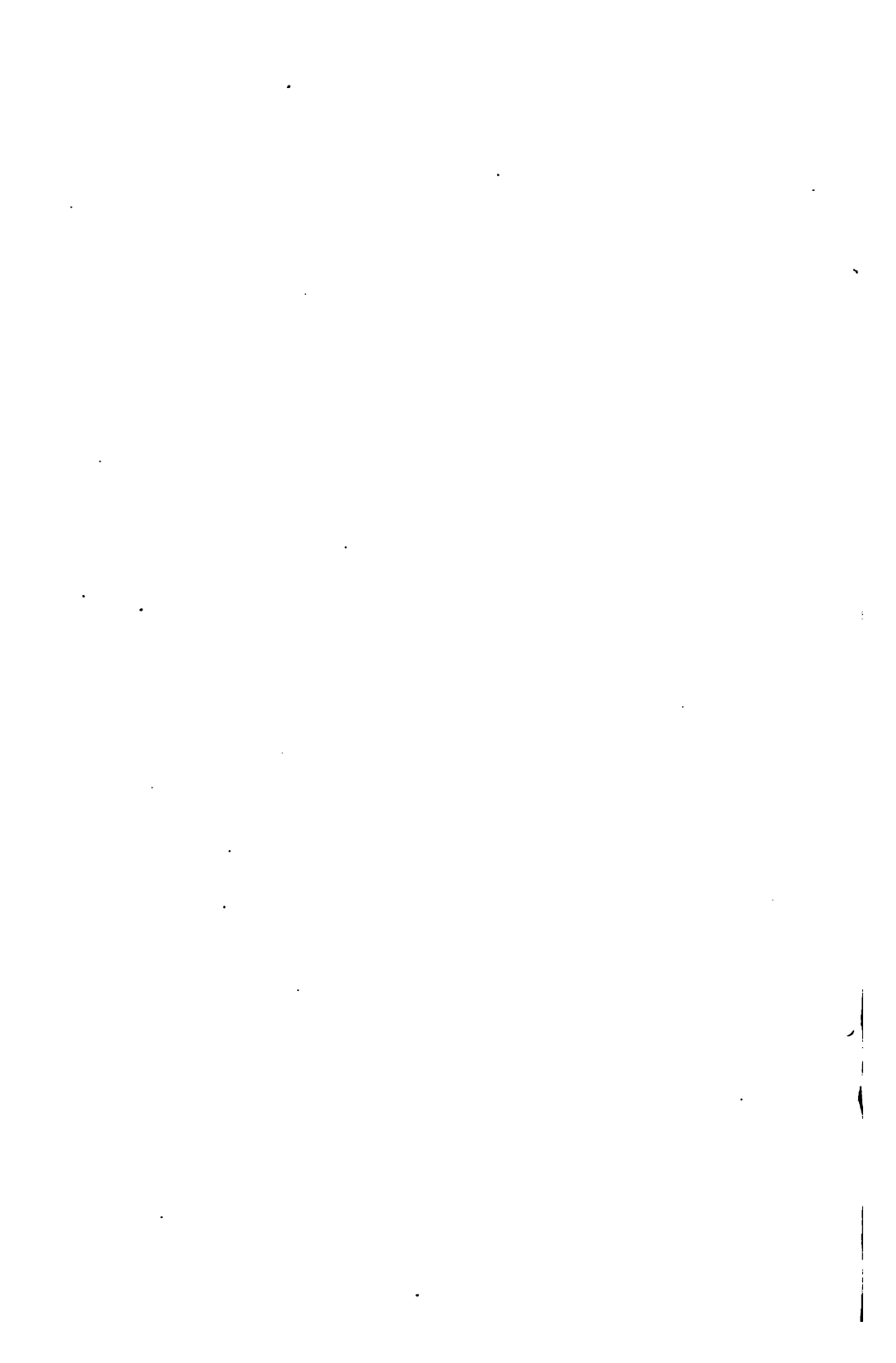
and exhibited a large number of specimens, many recently acquired from the British Museum, which furnished a sample of the collections which it is proposed to have in the new Museum to illustrate such text books as St. George Mivart's. Besides this the lecturer had kindly provided live specimens from London of the green Tree Frog, and the Salamander, and Mr. Hulme lent some coloured drawings.

SATURDAY, NOVEMBER 23RD.

DR. HUDSON, of Clifton, gave a lecture on

THE SUN,

to a crowded audience; and illustrated it with his well-known illuminated diagrams. An account of the lecture will be found in the *Marlburian* of Nov. 29th.



PERSONAL EXPERIENCES IN ORNITHOLOGY.

By G. T. K. MAURICE.

READ AT A MEETING HELD ON THURSDAY, MAY 25TH.

I have been asked to read you a paper about "Birds," and more especially about the Birds of Marlborough, which you can watch and constantly see about you. I will begin by showing you the different parts of the bird's skeleton, and as far as I can the uses to which they are put. The first and most obvious distinctive feature in the skull of a bird lies in the jaw-bone, which in a bird is entirely toothless and covered at the end by a horny encrustment termed the beak or bill. As in a mammal you can tell by his jaw and the shape and size of his teeth whether he is a carnivorous or graminiverous animal, so in a bird you can tell by the size and shape of his bill whether he is a bird of prey, a flycatcher, or creeper, woodpecker, or almost any other sort. A bird of prey has a strong curved beak, while a bird like a swallow or flycatcher, which feeds chiefly on insects, has a more slender and softer bill, whilst a woodpecker who uses his bill a good deal for making holes in wood, and so requires a very strong bill, has a bill which especially in the case of an Ivory-billed woodpecker (an American cousin of the green woodpecker) is remarkably hard, indeed the Ivory-billed woodpecker will, people say, get through almost anything; if shut up in a room he is pretty sure to get through the door with his strong beak before the day is much older. Some birds like the ducks and others of that sort, who spend a long time in the water fishing and dabbling about for water insects in the mud and banks of rivers, or in heaps of water-weed, have soft spoon-like and sensitive bills with which to procure food. The bill of a duck has got some sort of teeth which I have heard are used to filter the water they drink through, but I cannot vouch for the truth of this. Birds do not move their jaws in precisely the same manner that an animal moves its jaws on account of the manner in which a small bone called the quadrate bone, from its square shape, is articulated to the bones of the skull.

One of the chief distinctions between a bird and a mammal lies in the neck. The mammals never have more than seven vertebrae in the neck. The long neck of a giraffe and the short neck of an elephant are both made by the extension or compression of these seven bones. Now a bird never has less than nine, although it can have many more, a swan for instance has twenty-three. The bones of the neck are also extremely flexible, as the peculiar habits of

birds require, but those of the back are immovably connected together and in some cases even fused together as in the common fowl. The seven or eight small bones which form the tail are moveable and generally ended by one bone longer than all the rest. The tail is mainly useful to support the retrices which are the tail feathers. It is now necessary to turn to the body and limbs of the bird: the ribs are chiefly remarkable for the flat appendages which overlap them, starting from the base of the rib in front. I have not been able to find out the object of this flat appendage. The sternum or breast-bone is placed much lower than might be expected from the appearance of a bird when it has got its feathers on. Its substance is much flattened, and it has a strong ridge or heel of bone which varies in depth according to the birds' power of flight; so an eagle has a very deep heel, while an ostrich has not got one at all, or at any rate a scarcely noticeable one.

Between the sternum and the neck lie four clavicles or collar bones differing in size and shape in the different species of birds. One set of them the "*Os Furculare*," so called on account of its forked shape, is sometimes absent, its place being supplied by a ligament, but the other set, *clavicula coracoidæ*, is always present; these two sets are called in plain English the merry-thought and the neck bones. The bones of the wing have a considerable resemblance to the bones of the arm of a man. The upper wing bone varies according to the birds' power of flight, being long in the albatross and other strong flying birds, but short in the Penguin and Cassowary and other birds that do not fly much; the two bones of the forearm, the ulna and radius, are also large in the strong flying birds and serve to carry a large expanse of feathers. At the end of the ulna and radius are attached two small wrist bones which bear a quasi hand, composed of a sort of thumb and finger; in fact the whole wing is very like a man's arm and hand or the fore legs of an animal. The bones of the leg are the "*Os Femore*" or thigh bone, and the tibia or shin bone to which is attached at the top an undeveloped *fibula*, which gradually tapers to a point. The part of a bird's leg which answers to a man's instep is composed of one bone, jointed at the upper extremity to the tibia and at the lower to the toes or claws.

In all the structure of a bird we see a wonderful provision for ease of flight; the bones in a mammal are strong and thick and filled with marrow and very heavy, but if a bird's bones were made like this the bird would have considerable difficulty in flying, but instead of this the bones of a bird are strong but much lighter and can be filled with air as the bird flies, so making the bird fly much lighter, in fact I have read that in some birds the bones are so far connected with the lungs that if the bird's leg be broken and its head held under water the bird will breathe through the broken limb. The feathers of a bird are also made with the same view, namely, for ease of flight. Suppose

you spread out the wing of a bird, its plumage will be seen to consist of a row of long quills whose insertions are covered by a number of smaller and softer feathers. The quills are called the *principles* and the smaller feathers the *coverts*. The *coverts* are divided into two classes the greater and lesser *coverts*. The under surface of the wings is covered with a dense layer of "under *coverts*." On spreading out the wing it will be seen that there are ten quills coming from the hand and wrist of the bird; these are called in point of order the *primaries*, and indicate, by their shape and development, the mode of flight followed by the bird. If for instance they are round and short, as in the wing of a sparrow or greenfinch, the flight is slow, and to a certain amount laborious, and much beating of the wings is required to cause motion; but if they are long, firm, and flat, as seen in the eagles and falcons, the flight is easy and graceful though capable of extraordinary speed. If they are large and concave and edged with soft feathers as in the owl, the flight is quiet and noiseless; some birds, such as the ostrich and emu and other running birds, possess such small *primaries* as scarcely to be recognised as belonging to such large birds.

The two bones of the fore-arm, the *ulna* and *radius*, carry the next set of quills called the *secondaries* and the upper wing bone carries the *tertiaries*: neither of the latter are very important. The next set of quills are placed in the tail, and are called the *retrices* and are used as a rudder, hence the scientific name, their coats are covered by the upper and under tail *coverts*, which are generally small, but in some cases are large, as in the peacock whose train is mostly made of the tail *coverts*.

A few words might not be out of place here about the peculiar digestive organs of birds. As a bird has no teeth, as animals have, it cannot of course masticate its food, therefore it is necessary for it to have a cavity in which the process of insalivation can be performed, so it is provided by nature with a crop which receives all the food directly it is swallowed. The crop is situated a little way below the beak, and if you are feeding young birds you can see right into it, or at any rate in some kinds. I have often been able to do so in a pair of young carrion crows which I possessed. This crop may be called the first stomach. The gastric juice is generated in a second stomach; from this second stomach it passes into the gizzard or third stomach; perhaps though I ought hardly to call this a stomach, as it is really a hollow muscle which contains a number of stones to assist the gizzard, which acts like a mill to crush the food. The organs which I have described here are the organs of a *graminivorous* bird. If you were to dissect a hawk or any other bird of that tribe you would find all the receptacles united into one; a small muscle supplies the place of the gizzard, which is not required on account of the softness of the food.

It is now time to say a few words about the habits of birds. Some birds are very slack about building a nest, such as the hawks, who generally prefer to take the deserted nest of some magpie or crow or other biggish bird instead of building one for themselves: they, however, do sometimes build their own nest. C. E. Cooper and I one day found a nest from which afterwards we got some sparrow-hawk's eggs, which we think was built by the bird itself; the sticks were too big for a magpie to have carried, or even a crow; the latter might just possibly have begun the nest and been turned out by the hawk, who is not a great respecter of private property, but I never have seen or heard of crows' nests being taken here lately, except one I took at Pewsey, and the nest also was almost flat, with the slightest possible dip in it, and all the crows' nests I have ever seen have been deep and cup-like, and well lined with hair. Owls also will take deserted nests; last holidays Cooper and I found 2 owl's eggs in a deserted crow's nest in Devonshire, and T. H. Parr and I found 2 more owl's eggs some time back at Rockley in a squirrel's nest, in both cases long-eared owls.

While other birds, such as the long-tailed tit and chaffinch, make most beautiful and elaborate nest, some birds are dreadfully stupid about making a nest, such as jackdaws. In the forest, not far from Cadley, there is a large hollow oak in which a jackdaw tried to make its nest. The trunk of the tree is very thick about five foot in diameter and hollow down to the ground; the mouth of the hole, which is big enough for a small boy to get into, is about fifteen feet from the ground, and this hole the jackdaw tried to fill up so as to make its nest; it filled and filled till long after other jackdaws had finished building, and then it gave up and went away. Perhaps the most curious nest is the dabchick's which is placed right in the water and made of water weeds moored to some branch; how it is that the eggs can get hatched in such a damp place I cannot tell. It is a disputed question whether the weeds with which the eggs are covered when the old bird is away are used merely for purposes of concealment, or also to help hatch the eggs. I think it is for both purposes, as I notice that the old bird is not nearly so careful about covering up her eggs when they are fresh as when they are hard set. It is a curious sight (and a sight that is rather hard to see) to see the old bird covering up her eggs. She sits up in her nest and pulls the weeds over with her beak, and I rather think with her feet too, but I am not at all sure whether she uses her feet or not. I have often watched, but I cannot be quite sure. It is so very hard to get close under the willows. Another curious habit in dabchicks, which is, I think, confined to them, is that of *actually carrying their young under their wings*. I am afraid very few of you will believe me, but I myself, in company with two other fellows, namely, P. M. Coats and W. A. King-Harman, who were at that time in Mr. Mansell's house, were walking by the river in a

meadow belonging to my father, when we saw two young dabchicks near a nest, whose eggs ought then to have been hatched; we found the egg-shells and one egg in the nest. One of the young birds did not go far from us, the other sitting near its parents on the other side of the river, where the two old birds kept on popping up in the weeds, evidently much frightened on their young ones' account, and not showing their usual fear of a human being. Presently one of the old birds, probably the hen, dived and came up near to the young one *who crept under her wing, and then she carried it back to the other side.*

I am sure birds converse together in a way. They can, at any rate, warn one another of danger; two or three years ago the jackdaws, which were more numerous in the Church tower than they are now, used to come down regularly at breakfast-time and eat our strawberries. One day I saw a jackdaw up in a tree, and as we wanted a jackdaw to hang up as a scare-crow, my father went to try and shoot it, while I stood at the window to watch the result. To get at the jackdaw he had to go round behind a wall; as he was going round I saw another jackdaw in another tree just above him. I could not shout, as that would have frightened the first jackdaw, so I watched. The second jackdaw soon saw my father, and he flew to the tree where the first jackdaw was, and as he passed over gave a loud "jack." The first jackdaw immediately looked round and flew away. The second jackdaw had evidently warned him of his danger.

There are some curious superstitions about some birds in different parts of England. In Devonshire last holidays Cooper and I asked a boy whom we met if he knew of any nests. He said he knew of one, and going along to see this nest we began talking to the boy, and among other things he told us of a bird he called a cuddy; we know by this time that cuddy is the Devonshire for a wren, it is also Yorkshire for a hedge sparrow; he told us that if you find a cuddy's nest and take out one egg every day it will go on laying till it has laid 100 eggs, and then it will lay a black one, and then it dies either inside or just outside the nest. I have never heard of this before; I do not know whether it is believed in other counties. The food of birds consists of almost everything imaginable: insects, grubs, and small and large animals. The skill displayed by some birds in catching their prey is remarkable—the thrush for instance will jump about and peck at the ground (as Mr. Dawson told us last term) to make the worms think that their arch-enemy the mole is coming after them, upon which the poor deluded worm comes to the top and is eaten by the thrush. The thrush again, as most of you know, has a great partiality for snails, but is unable to eat them because of the shells; here again their cunning obtains the desired dainty, for the thrush lays hold of the snail and dashes its shell to pieces on a stone and then eats it in peace. The Kestrel hawk, which by the bye boasts of a good many

names, (such as Wind-hoverer and Stannel Hawk) will, so I have read, eat beetles which it catches in its claws and eats while on the wing as a desert after a more substantial dinner of mice, lizards, and frogs, and other small deer. Sparrow-hawks, I believe, hunt hares in couples, flying along close to the ground, and striking at them every now and then. A fellow, who has now left the College, named H. J. Cooper, told me that he had once seen them hunting a hare like this, and I have read of it since then in some book of ornithology.

A great deal has been said and written about the cruelty of shooting birds in the breeding season, but nobody seems to think it cruel to shoot a kestrel during the breeding season. Keepers have often told me that they leave the nests of shy birds such as the hawks, magpies, and jays till the eggs are hard set, at which time the old bird sits closest, and then they shoot her on the nest and watch the nest till the cock bird comes, and then they shoot him. This of course is a most brutal thing to do, and in the case of the hawks is bad policy, at least so a writer to the *Field* says, for he says the hawks always strike the last bird of a covey when the covey rises, and as the weakest bird always rises last, diseased birds which are of course weakest and would be the last to rise, are struck by the hawk, and so the spread of such diseases as affect game birds, such as grouse disease, is stopped.

During last holidays I went to a place some way from here, called Sound Coppice, and I asked a carter whom I saw there if he knew of any nests; he told me of a tree mag's nest and a bush mag's nest. Now a short time before I had read in the *Birds of Marlborough*, the following words, "The old myth of the existence of two species, i.e., the 'Bush Magpie' and the 'Tree Magpie' is still firmly believed here." So I said to the man, supposing you saw a bush magpie and a tree magpie together could you tell the difference? "Oh! Yes," he said, "A bush magpie has a tail so long (marking off a piece about a foot long of his stick), and a tree magpie has a smaller tail about so long" (marking off a smaller slice of his stick about seven inches long). Then he also told me that you could teach a bush magpie to talk, but you could not teach a tree magpie to talk.

I am afraid that I have digressed from my original subject, namely, the skill of birds in catching their food. Mr. White has recorded an instance of the great tit's cleverness while hunting for its dinner; he writes to the Rev. Mr. Wood, from whose book I have copied these words:—"In deep snows I have seen this bird while hanging with its back downwards draw straws length-wise out from the eaves of thatched barns in order to pull out the flies which were concealed in between them." The great tit and the blue tit are also very much inclined to cannibalism; if they find a bird benumbed by the cold they will kill it and split open its head and eat its brains. I have often

watched the great tit in the Forest splitting open different forest fruits, such as beech nuts ; they have two ways of doing it, either by holding the nut between their claws and then beating it with its beak, or else by holding the nut in its beak and knocking it against a bough.

I have very often found fixed into crevices of the rough bark of such trees as the poplar and birch, nuts with part of the shell taken away and the inside eaten. I have been told that this is the work of the nuthatch, but I have never seen any record of it in Ornithological books. If it is done by these birds, it is, I think, a good instance of the skill of birds in getting their food. If on a summer evening you watch the swallows catching the large yellow underwing moths you see a great proof of skill in catching prey in the remarkable manner in which while on the wing and with no other instrument but their beaks, they detach the large wings of the moth and send them fluttering to the ground, and yet the bird still holds the body of the moth and eats it.

Owls again show skill in catching fish. A letter which was published in the *Field* a short time ago said that owls are very fond of fish, which they catch in the following mannner : they select a large stone which does not stand too high above the level of the water, and take up their position on it and wait till the unwary fish comes by and then strike it out of the water with one claw.

Owls must be pretty good hunters, or at any rate the tawny owl must be. A writer to the *Field* says that in one nest he found three young owls, five leverets, and three young rabbits, three thrushes, and a trout weighing half-a-pound. As the adult bird only measures thirteen inches, this is not bad work.

By-the-bye talking of owls, have any of you ever kept a tame one? If you have you must have seen them eat a mouse ; for the benefit of those who have never seen it I will describe the process. The owl first kills the mouse by biting it across the back of the neck ; it then throws it up in the air and catches it head foremost in its beak ; after catching the mouse it swallows it, till nothing can be seen of the unfortunate mouse except its tail, which the owl allows to hang out from one side of its mouth. It then rolls the mouse about in its mouth to smooth all the hair the same way, and then gives a great gulp and the mouse is gone. I suppose all owls eat mice the same way ; the only one I have ever seen eat a mouse was a barn owl.

The excessive daring of all birds of prey, more especially of the hawks, is remarkable. A friend at this college told me that he once while standing near a keeper saw a sparrow hawk swoop down and seize a young partridge that had been brought up by a bantam hen and was feeding at his feet, and fly off with it.

Perhaps before I end this paper, I ought to say a few words about bird's nesting. It has been practised from the earliest ages, for we read in the Pentateuch that Moses made a law, that if you found a nest you might take the eggs and young, but that you might not hurt the old bird.

Bird's nesting is generally the first branch of Ornithology taken up by anybody, and is very interesting as all who have tried it must find, unless of course they do not find anything, when the usual course is to come and beg from more successful comrades or to buy eggs. In the first case he does get not many given him; and in the second, he is always liable to be deceived, as I have been. In fact, I have been deceived so often, giving ten times too much for common eggs, believing them to be some very rare bird's egg, and as I came to know more about eggs, finding out what they are, that I have made it my rule not to buy a single egg, and I have not bought an egg for three years except two long-tailed tit's eggs that I bought in a nest last term.

Bird's nesting has, I fancy, a great deal of chance about it, although of course there are some birds whose nests can only be found by careful searching, such as the chiff-chaff, stonechat, and others who make their nests in thick bushes near the ground. If you find a nest, the next thing is to identify the eggs, and in many cases this is impossible to do unless you see the bird. Of course the nest is very often a great help in this way, but still very often it is no help at all, as in the case of the golden oriole, whose nest and eggs cannot possibly be distinguished from a blackbird's, so that unless you see the bird you can never say for certain that you possess golden oriole's eggs. Eggs too vary very much in colour, some having no colour at all, for the cause of which there are several theories. One theory is that the want of colour is caused by a disease in the parent bird, which is very likely. Another theory, and one which I rather fancy is true, is that eggs laid in a damp place have less colouring than eggs laid in dry situations. I have myself observed that such is often the case. I have found two chaffinches' nests in our garden at home, which runs down to the water, one in a tree overhanging the river and another on a house about five yards from the water, both in damp places, and all the eggs in both nests were nearly colourless and some of them quite colourless. I have found thrush's eggs near the same place with only two or three spots on them, so there seems some foundation for the theory. I will not keep you any longer, but will end by thanking you for your attention to my short and very disjointed paper.

PHOTOGRAPHY,

READ BY H. M. ELDER, ESQ., O.M., THURSDAY, MAY 11TH.

BEFORE I begin to talk to-night about the actual substance of my paper, I think I ought to say a few words about light, and the way it is affected by prisms and lenses. You all know, to start with, that light proceeds in straight lines or rays, and that when a bundle, or, as it is technically called, a pencil of these rays is made to pass through a prism, it is bent round towards the thicker part of the prism. Also you know that ordinary sun light, or any white light treated in this way, comes out of the prism broken up or separated into a band of colours, of which violet is bent round more than the rest and red less.

Now I dare say many of you have tried the simple experiment of taking an ordinary lens or magnifying glass, and by it, throwing an image of the sun on to a piece of paper and so burning a hole in the paper. Perhaps in doing so you have not recognised that the round bright spot is really a picture of the sun, but it is so and by the help of the black-board I will try to show you the way this image is formed.

Suppose you have a small bright object, a point of light, sending out rays in all directions, and place a lens in front of this so that some of the rays of light fall on to the lens. Rays of light are bent by a lens towards the thickest part in much the same way as in a prism. If the lens be properly made, these rays will meet in a point on the opposite side to the luminous point. This point is called the image of the luminous point. Now let the bright object be not a point but an object of some size. This may be regarded as a collection of points. The image of each of these then is formed on the opposite side of the lens, and if you place a sheet of paper or ground glass at the place where these images are formed, you will see on it a picture of the object turned upside-down.

Now from what I mentioned about violet rays being bent most, and red least, you will easily see that a violet image is formed nearer to the lens than that made by the red rays, so you will get a little row of coloured pictures of your object, the violet one being nearest the lens and the red furthest away. This makes the picture on the screen confused. To obviate it Dollond the optician invented a plan, which consisted of using two lenses of different shapes and different kinds of glass, by which these or rather two of these images were made to run together into one place. You will see the importance of this in photography presently.

Again it is found that a large lens will not bring the rays of light from a point exactly to a point again, so there is a confusion and indistinctness caused by this called "*spherical aberration*," to distinguish it from the colour indistinctness called "*chromatic aberration*." This confusion is capable of accurate measurement, and its measure is found to be a quantity which only varies for the same lens as the square of the width of the lens; therefore the smaller the lens is across, the less the confusion will be, and the more distinct the picture will appear. But then the lens will not let so much light pass, and the image will be less bright.

You have most of you seen a "camera obscura" no doubt. In that, a picture of the surrounding country is formed by a lens in just the way I have explained, and received on a white sheet. Well that is exactly what a Photographic camera is. An image is formed by the lens, and received upon a sheet of ground glass, which can be moved backwards and forwards till this image is clear and distinct, that is until the glass is where the rays meet. Then the ground glass is removed and the prepared plate substituted in its place.

Those of you who go to chemistry lessons or to the laboratory, will have seen chloride of silver made, and have noticed that when exposed to light, it changes colour from white to a purplish black. This change is caused by the action of some rays of light which mostly coincide with the violet rays of the spectrum formed by a prism. They are called actinic rays, and are those which imprint the picture on prepared paper or glass in photography. The brightest part of the light coincides with the yellow rays of the spectrum, so in focussing your picture on the ground glass screen of the camera, you focus for these, and consequently, since the strongest chemical or actinic image is not quite in the same place that the yellow image is, the picture comes out blurred and indistinct. But I explained a few minutes ago how that Dollond had invented a lens which did away with this "*chromatic aberration*." So you see one of the requisites in a good set of apparatus is an "*achromatic*" lens.

Now I wish to say a few words about the history of photography, which is an art of comparatively late invention.

It was first shown by the great chemist Scheele that sun-light had a certain effect on some salts of silver, but yet nothing was done at all bearing on photography, till 1802, when Thomas Wedgwood published his method. This was very primitive and poor; it consisted of merely producing a negative picture on paper, by means of nitrate of silver, and he did not even discover any means of fixing his impression. The first real advance was made by a Frenchman, Nicéphore Niépce, in 1816, for he produced a veritable negative copy of the image formed by a camera obscura. His

experiments were chiefly directed towards producing an image on stone, from which lithographic impressions might be taken. At the time of his working at this, many letters passed between him and his brother who was in England. These are often very interesting. I will quote the one in which he describes the setting up of his camera. On May 15th, 1816, he wrote—"I placed my apparatus at the open window of the room where I operate, in front of the pigeon house, and made an experiment in the usual manner. I obtained on the white paper the whole of that portion of the pigeon house which is seen from the window, and a faint image of the casement, which was less brilliantly lighted than the other objects, the image reflected being of the most minute proportions." In another letter he wrote—"My future investigations will be conducted with a three-fold object: (1) to obtain a clearer definition of the reflecting image; (2) to transpose the tints or shadows; (3) to fix the tints, an operation which is by no means an easy one." However, though in the right track, it was not till 1823 that Niépce really secured a permanent photograph. This was done by means of a sort of asphalt called "bitumens of Judea," which seems to be rendered insoluble in certain oils by the action of light. There are several specimens of these to be seen in the British Museum and the Louvre.

It was not till after this that Daguerre began to work at photography, and he did not meet Niépce till 1827 when the latter was on his way to visit his brother in England. Niépce brought some pictures to England with him to submit to the Royal Society, but as he kept his method a secret, they would not hear him. While in England he lived near Kew, and there is still a picture of Kew Church taken by him in the British Museum. In 1829 he and Daguerre entered into partnership. Daguerre was a painter and director of the diorama at Paris. He had for a long time been trying to fix the image, but there is nothing to show that he had succeeded. Niépce was already a successful photographer at the time of forming the partnership, so you will see that Daguerre can claim but a small portion of the credit due for the invention; in fact it seems that he behaved discredibly about it to young Niépce, for in 1831, Nicéphore Niépce died, and left his share in the partnership to his son Isidore; Daguerre in the mean time worked hard and well and elaborated the process now known as Dagerreotype, but which ought rather to be called Niépceotype. Then he bought Isidore Niépce out of the partnership. The friends of Niépce interfered on this but without much success, for the French Government awarded a pension of 4,000 francs to Isidore Niépce, and 6,000 to Daguerre.

In England, photography was studied by Henry Fox Talbot; I need not now discuss his method but will merely mention that he used paper in his camera, and fixed the image with a solution of common salt, (sodium chloride) till

Sir J. Herschel proposed to use hypo-sulphite of soda, which is used to this day. Talbot's most important discovery was the value of gallic acid, for which was afterwards substituted the pyro-gallic acid or "pyro," of which you will soon hear more. He discovered that it rendered his prepared paper much more sensitive to light.

In 1843, Niépce St. Victor first tried taking negative photographs on glass, on which he spread a film of albumin, (white of egg,) or gelatin to take up the chloride of silver or other sensitive agent. Soon afterwards Archer suggested collodion, a solution of gun-cotton in ether, and with the exception of the invention and perfection of gelatin dry plates, and improvements in the methods of printing, but little more has been done of late years.

Efforts have been made with some small success, to retain the colours of natural objects in photographs. Becquerel in 1854 showed that the colours could be impressed on the picture at the moment of its formation, by using the violet chlorides of silver to coat the plate, and by it got a creditable coloured photograph of the solar spectrum. But he was utterly unable to fix the colours. Niépce St. Victor tried the effect of some of the alkaline earths, by impregnating the chlorine water with which he excited them with different kinds of earths, and succeeded in taking some chromo photographs of dolls which are still in a good state of preservation; but as they will not stand the action of day-light they are kept in the dark, and can only be seen by candle light.

Now I come to perhaps the most interesting part of my subject, that is, the practice of photography. I must first tell you about choosing a camera, and then discuss the most useful lens, and then give what practical hints and tips I have discovered, in exposing, developing, and printing.

In the first place, no one now-a-days, or at least no amateur who is beginning, would think of using the clumsy, dirty, and slow old "wet plate" process, so I shall not discuss that, but go on at once to dry plate work. There are many camera makers, and excellent ones too, but of those that I know, Patrick Meagher, of 21, Southampton Row, Holborn, is the best, and next to him, W. W. Rouch and Co. My own camera is made by Meagher and I think it can scarcely be improved. It was expensive I must confess, costing about £12 without the lens, which cost £7 more. Its two faults are that it is not as light as one of Rouch's cameras of the same size, and has not an almost unlimited length as they have, but these faults are amply compensated by its neatness, compactness, and the exquisite finish of its workmanship; and I should certainly recommend anyone who thinks of taking up photography, to invest in one of Meagher's whole plate cameras, with double swing back, repeating front, and three double backs or plate cases, sufficient to carry six

plates. As for a stand, Kennet's are undoubtedly the best, as they are very firm and light, and the legs may be shortened or lengthened at pleasure.

Having got the camera, it should always be carefully examined to see if it is quite light tight, this is done by opening the focussing screen, and getting a friend to carry a light round the camera, while you carefully examine the inside, having shut out all light from your eyes by the focussing cloth. The least speck of light must be carefully patched out, or it is hopeless to expect to do good work. Meagher always tests his cameras thus, so you may depend on their being safe.

Next as to the lens to use. The most generally useful one is that called by J. H. Dallmeyer, the maker, the "Rapid Rectilinear," of which I have one here. This is a very rapid lens, giving an image wonderfully free from distortion, and covering an 8½in. by 6½in. plate with great clearness. Dallmeyer's work may always be depended on to be as good as possible. This lens costs £7. Ross also makes a lens only second to this, called the "Rapid Symmetrical," which costs £6 10s., but in my opinion this is well worth the extra ten shillings, it also makes a very good portrait lens, and in fact will do most things that an amateur requires. It is unrivalled too for instantaneous work. Mr. Miley, of Trinity College, Cambridge, however tells me that Ross' small lens, for 4½in. by 3½in. plates, is considerably faster.

Before I leave the camera and lenses, I may as well mention a neat little apparatus called the "Scenograph" brought out by the Sciopicon Company; its price (for plates 6½in. by 4½in.) is £2 10s., and it is a marvel of cheapness and lightness. But though very good at the price, it has many defects; the lens, at that price, cannot be a really good one, though in most cases it is very fair. The camera itself is seldom light tight, and wants a good deal of dodging with black paint and velvet before it is really serviceable. In fact a small and cheap apparatus has so many faults, that I should certainly recommend anyone who thinks he would be likely to stick to it, to lay aside £25 and set up a whole plate camera by Meagher, and a Dallmeyer "Rapid Rectilinear" lens to begin with. Afterwards a Dallmeyer Wide Angle lens may be bought, and will be found very useful for taking rooms and buildings. The advantage of having good apparatus to start with, in addition to the certainty of producing good work, is that no ordinary bungling will damage it, and unless it is knocked about by sheer carelessness, you will always have your money's worth. Of course, anyone who does not care about taking such large pictures, can buy a smaller, and therefore cheaper camera and lens, but I predict dissatisfaction for anyone who does.

Next I come to the dark room and its appliances. A good dark room is a very great convenience, but it is very difficult for many amateurs to procure. If a room is handy, with a little pains and plenty of glue and

brown paper it is not difficult to make it dark. You must however remember that the least spot or pin hole of white light is fatal to the clearness of your pictures. Every pin hole must be stopped by gluing brown paper over it, and may be rendered more safe by varnishing the paper with a coating of Brunswick black. The windows should be covered with two thicknesses of Wratten and Wainwright's ruby paper, and the edges carefully filled in with brown paper and Brunswick black. If possible the window itself should have one thickness of paper glued on to it, and another should be fastened on to a framework, which fits tight to the casement, and can be removed on a very dull day, as sometimes one thickness is enough. Be careful too, to so arrange that the window will open, or you will find in the summer that the fumes of ammonia and the heat are overpowering. If you cannot get an empty room, you may, as I did at first, do your developing in any dark room at night, by the light of a red lamp. I found the following plan succeed admirably for slow acting plates, though it would certainly not do for very fast ones. Take an ordinary dark coloured hock bottle and knock the bottom out, and bend round a bit of tin to make a loose cap for the top of the neck; then get a small paraffin lamp, (cost fourpence half-penny). If the bottle be put over this lamp, you will get a very fair developing light, though far from being perfect. Captain Abney suggests an equally light and handy lantern, which has the advantage of giving the right kind of light; make a sort of crinoline of three small hoops, and cover it with either Wratten and Wainwright's ruby paper, or paper varnished alternately with aurine and magenta. This can be made for a few pence, but for eight or ten shillings you can get a first-rate lamp, from any of the makers, such as Wratten and Wainwright, or Hunter and Sands. In your dark room, a sink, with a screw tap above, is a great advantage, but if you cannot get that, you must have a small table, that will not easily upset, a pail to throw waste chemicals and washings into, and a plentiful supply of water.

So much for apparatus. Now as to plates to be used. A beginner should never try and work with plates that are too sensitive, it is a great mistake to do so, as at first, one is sure to fog a few plates, and non-sensitive plates do not fog so readily. I began with the Uranium Company's dry plates, and there are none better, though I believe Hunter and Sands' "German" plates and Edwards' "I X L" plates are equally good. But the Uranium plates are cheap,—a great advantage when you are practising and destroying many without a fair result—and they are very fairly reliable. Cor's "Derby" plates are still cheaper, but are not to be trusted, at least that is my experience. After getting well accustomed to these, I should recommend you to change to Wratten and Wainwright's "Instantaneous" plates. There are none better to be had. They are very rapid, do not easily fog in

developing, and are very sure. Once having used them you will never change again, in spite of their somewhat appalling price.

As to exposure I can give no hints. Each lens and each kind of plate wants a different exposure in the camera, and it also depends on the size of the stop used, and on the brightness of the day. Sometimes twenty seconds is not enough to take a picture that you might almost use your instantaneous shutter for with another stop and on a brighter day. However on a sunny day, with the smallest stop in a Dallmeyer rapid rectilinear lens, and the Uranium plate, if you try five seconds, you will not be far wrong, and will easily be able to correct your next exposure by the result of your first.

There are two main methods of developing. That by ferrous oxalate, and that by pyrogallic acid. The ferrous oxalate is much the clearest, and does not stain the film brown as does the pyrogallic acid or pyro; but in case of over or under exposure you cannot rectify it in developing, nor can you sometimes avoid fog. Hence for the beginner, at least, it is out of the question. The best method for the learner is that known as Edward's glycerin developer.

When the plate is taken out of the camera it shews no sign of a picture being on it, hence the need for this development, or reduction of the silver on the plate. In Edward's method you have two stock solutions, A and D. D, the developer consists of—

Pyrogallic acid	...	...	...	...	1 oz.
Glycerin	...	...	...	...	1 oz.
Methylated alcohol	...	...	...	...	6 oz.

A, the accelerator of—

Potassium bromide...	...	...	...	...	60 grains.
Glycerin	...	...	...	...	1 oz.
Strong Ammonia, sp. gr. : '890	...	...	...	...	1 oz.
Water	...	...	...	...	6 oz.

These two solutions may be kept good in stoppered bottles for months.

When you want to develop, consider how much you are likely to want, and then make up two fresh solutions, one part of each of these to fifteen of water (preferably hard), label them A and D, and take them into the developing room. You will also want a saturated solution of alum and a solution of hypo-sulphite of soda, or hypo, of four or five ounces to the pint.

Let us suppose a half plate is to be developed. Lay it in the developing dish and flood it with water, removing any bubbles there may be from the plate with the finger. This is very important to avoid lines and spots in the negative when finished. Next while the plate is soaking in water pour out

one ounce of each solution, A and D, pour the water off the plate, mix the two and flood the plate with them. If the exposure is correct the image will appear in a few seconds. Move the dish gently about till the plate is nearly black all over, and you can scarcely see the picture, pour off the mixture and wash with water, and then lay the plate in the alum solution for a few minutes. This has a double effect, it hardens the film and prevents "frilling" or peeling off, and it also takes out the brown stain left by the pyro, or at least partially does. While it is soaking you may go on with the next plate. Then on taking the first out of the alum, lay it in the hypo solution to fix. This may be done in the light, but it is safer to do it in the dark room. When, on looking at the back of the plate no white is seen, it is fixed, and must be washed in frequent changes of water for two or three hours, and then set up to dry in a warm place, but not hot enough to melt the gelatin of the film.

If the plate be under-exposed, the image will not appear quickly enough and you may add a little more A; if over-exposed the image will flash out too soon, and I find the best plan is to dilute the developer by adding water. This method has many disadvantages, notably staining the plate so that it has to be washed in alum, or alum and citric acid, or hydro-chloride acid, or ferric-chloride, and, when you have got well accustomed to the work, I should recommend a change to Wratten and Wainwright's own developer for their "Instantaneous" plates, with the addition of a little solution of sodic sulphite. I need not however discuss this now, suffice it to say that I find it to be a good plan, not only to soak the plate in alum between the development and fixing but to soak it in a moderately strong solution of alum and citric acid after fixing; this leaves a beautifully bright and clear negative.

Always develop a plate up very much more than when it appears to be done except in the case of a bad over-exposure, in which case I find it pay to under-develop and intensify with mercuric chloride.

If I were to notice every little point, I should never stop, so I hope you will come up to the table afterwards, and look at the specimens I have brought, and I will try and explain the faults in each.

When the negative is quite dry it should be varnished, and then you may proceed to print it. You will think at first it is a very simple matter to print a photograph, and so it is to *print* it, but to do it well requires a lot of care and experience. You will find that with due care a poor negative may be made to give nearly as good pictures as a good one.

The first great rule is not to print in the sun (except in the case of a very thick negative); for by doing so you lose much of the fine detail in the picture. If you have a thin negative you should cover it up with tissue paper to bring out the detail better. Sometimes part of a negative should be

covered and part not, and sometimes part should be printed in the sun, but experience only will tell this. Again, a negative may often be improved by varnishing the back with Iodine varnish, and scratching it off with a knife in the thick parts. I have now on the table printing frames shewing the method of vignetting with wool, and so on, which I hope you will carefully examine. You must remember always to print considerably darker than you really require your finished picture to be, as much of it washes out in toning.

To tone the prints:—This means changing the colour from the hideous brown they would be otherwise, to a rich purple black. They must first be washed thoroughly in water to remove superfluous silver, then they are placed in the toning bath which consists of fifteen grains of gold chloride to fifteen drachms of acetate of soda to forty-five ounces of water. While in this, keep turning them over and moving them about. They will probably be about half-an-hour getting the best colour; when the change has taken place they must be put into a bath of hypo, the same strength that you use to fix a negative. Great care must be taken not to get any hypo into the gold bath, for it will be rendered useless if this happens.

I have now said as shortly as I can, all I need tell you about the essentials of dry plate photography, and if any one here wishes to take it up and wants more advice about it, he should write to me at Trinity College Cambridge, and I shall be most happy to give him any advice I can.

ARCTIC EXPLORATION, *

READ BY A. H. BEESLY, ESQ., THURSDAY, JUNE 8TH.

WHEN I was a boy there used to be a custom at some Schools of putting the pudding on the table before the meat. The idea was that the puddings had to be eaten somehow and were most likely to go down easiest when the eaters were most sharp-set. If my part of the evening's programme proves like the puddings, somewhat stodgy, please swallow it in view of the second part, which it may help you to appreciate. Of the second part I am to act merely as showman. If it doesn't please you, you must not blame me. I was once at a lecture by Artemus Ward, when he began to soliloquise to the moon which rose at the back of the stage, keeping time to his words. But just when it ought to have become full a sort of spasm shook it, and it fell several inches, so as to put the lecturer's next sentence quite out of joint, and after a convulsive struggle or two it sank to rise no more. Artemus Ward gave a sigh and ejaculated in an injured voice—"And yet they recommended that young man to me as a respectable moonist!" Our "moonist" has a rather anxious outlook, for his apparatus, which we owe to Mr. De Lisle's generosity, is new and may not work smoothly. All I can do is to hope, for his sake as well as your's, that in his new venture he may find his slides as easy as Mr. Pickwick's, and to get the less interesting part of the evening over as soon as I can.

What is it that has given rise to Arctic Expeditions? Curiosity, perhaps, and love of adventure first of all. Some fisherman may have been driven north by stress of weather, or some bold rover may have set his sails for mysterious seas in the hope of gaining riches or renown, and have come back with strange stories which whetted the appetite of others of his kind, stories of lands where no night was, but perpetual sunshine and perpetual ice, of seas populated by portentous monsters, half beast half man, of a race of gnomes and dwarfs, the elvish hunters of those seas, clad in savage garb and uttering incomprehensible gutturals for speech; of mountains of fire and snow-begotten lakes of flame; of shores sown with gems, with which a man might in his ship carry off in one day a kingdom's ransom; and above all of vast lands which the first conqueror might claim as his own. Such tales, at a time when science was not, were all the more irresistible because half true, and just as the

* This lecture does not of course lay any claim to originality. I laid Captain Markham's books and the "New York Herald" chiefly under contribution for it. Nor, I fear, is it free from blunders, which I have not had time to rectify. It is printed, as it was written, merely as a sketch, not pretending to precision of details.

French critic says that through all our poetry there runs a grim and sombre tinge, due to the blood in our veins being the same that coursed in those of our carnage-loving ancestors, so it may be with our expeditions of to-day, and it may be the old fascination of the Unknown, felt by and transmitted to his descendant by some Viking, which, while love of science is the ostensible motive, as better becomes your modern rover, really animates the Franklins and Parrys and Youngs of our day.

However that may be, the history of Arctic Exploration begins, as all decent history does, in legend, for when good King Arthur ruled the land he is said to have conquered Iceland, Greenland, and Norway. We next hear of expeditions in Alfred's reign, and as Alfred has not yet been analysed into a myth we may conclude that the story of Othar's expedition is true, the more so as what touched his practical mind most was, we are told, the value of the enormous whales of the northern seas. As time went on and science dawned such mercantile motives were further stimulated by the hope of finding a short cut to the Indies, and science in fact became the handmaid of credulity, for when men had discovered the compass they did not cease to believe in impossible marvels attainable in the far north. In his second voyage, 1607, Hudson gravely records—"The 15th one of our company looking overboard saw a mermaid, and calling up some of the company to see her, one more came up, and she was then close to the ship's side looking earnestly on the men. Soon afterwards a sea came and overturned her. Her back and breast were like a woman's, her body as big as one of us, her skin very white, and long black hair hanging down behind. In her going down they saw her tail like the tail of a *porpus*, and speckled like a mackarel." Then with the precise accuracy which we have learnt to associate with accounts of the sea serpent, he goes on to specify the names of those that saw her as Thomas Hills and Robert Rayner. Even a century later the yarns of sailors were as wild as ever. In Charles II.'s time there appear to have been several people who professed to have visited the North Pole. One of them was asked if there was land there. "No," he said, "no land, only open sea." "Any ice?" "Oh no, no ice." "What sort of weather?" "Fine warm weather, as hot as Amsterdam in summer time!" The narrator of this dialogue goes on to remark "I should have asked him more questions but that he was engaged in discourse with his friend, and I could not in modesty interrupt them longer. But I believe he spoke truth, for he seemed a plain, honest, unaffected person."

If to the above motives, curiosity, love of adventure, hope of profit and territory, we add the modern ones, love of science, national emulation, and pity for lost explorers, we have an exhaustive list of the causes of Arctic expeditions. What has been the result?

Before this century Greenland, Iceland, Spitzbergen, Nova Zembla, Bering's Straits, had been discovered. But, speaking very roughly, the rest of our knowledge of the Arctic seas is the product of this century.

If you take up a good map on which the date of discoveries and their nationality is marked, the first thing that strikes you is the frequency of the figures 18. All the north-west of Greenland was discovered from 1840—1880 by England and America. All the islands and all the coast of N. America from 1820—1860 by England. All the north coast of Russia (except a small piece) by Russians, partly in the last century [but mainly about 1820. East Greenland was explored by the Germans in 1870. Franz Joseph Land was discovered by Austria in 1872—4, Wrangell Land was sighted about 1820, and proved to be an island in 1878. Of the couple of millions of square miles which compose the area of the Polar Seas you can therefore judge, first, how little is known even now, and secondly, of that little how much is due to the men of the 19th century.

I will now say a word about some of the most memorable expeditions, first premising that all such expeditions have chosen one of three routes. First, they have struck due north and hoped to go straight across the Pole. That was the favourite notion with our early explorers, before Bering's Straits had been discovered. (2) They struck north westwards, hoping to reach Bering's Straits by the sea north of North America. That was the favourite notion of the Parry and Franklin era. (3) They have struck N.E. and hope to get to Bering's Straits by the seas north of Russia. That is the favourite notion now. The North-west Passage was effected by Franklin in 1847 and McClure in 1853. The North-east Passage by Nordenskiöld in 1874. The most celebrated attempts to effect a North Polar passage are those of Barendz, Hudson, and Parry. There was a picture in the Academy not long ago of Hudson deserted in an open boat, and there was another picture in the Millais collection, I think, in which he or some other explorer is depicted as telling his story to his daughter. The face in the latter is, I believe, the face of Trelawney, Shelley's friend, and a most striking countenance it is, but no face could have expressed more daring than Hudson actually showed. The object of his voyage was "to discover a passage by the North Pole to China and Japan," and this was his equipment for that small project. For ship a cook-boat or yawl, named the "Hopewell." For crew 10 men and a boy. He set out in 1607, and though he didn't get to Japan, he did get between Greenland and Spitzbergen, farther North than any one after him, till Scoresby (1806), and he discovered the Spitzbergen whale fishery, which has been a source of wealth to England from that day to this. To illustrate this, I may say that whale-bone is worth £500 a ton, and that one whaler—the Arctic—which brought back, by the way, a bear some of you may have seen

in the Clifton Zoological Gardens, got in one year 28 whales, worth £18,925. He sailed on two other voyages, one to discover the N.E., and the other the N.W. passage, and in the second his crew mutinied, and set him adrift in a small open boat. What hindered Hudson getting further, was ice from 20 to 40 feet in thickness, thicker than the Baffin's Bay ice, which is five or seven feet thick, but not so thick as the ice west of the Parry Islands which is 60 or 70 feet thick.

About 10 years before Hudson's voyage, Barendz the Dutchman had sailed with the same object. Thirteen years ago I gave an account of his voyage, which exists among your archives, but to a Natural History Society I may repeat one of its results as showing what was the state of knowledge then. Barendz found myriads of the geese which visit Holland in summer, sitting upon their eggs. Hitherto these geese had been believed to be hatched from eggs which grew on the trees in Scotland. He got to the North East corner of Nova Zembla, and there he was ice-bound all the winter, and there he built a wooden house, a picture of which was drawn by his companions, when they came home, for Barendz never came home, but like Hudson died in an open boat, though unlike him he was surrounded by loving friends, who cherished his last words and mourned for him, as for one "on whom they had counted next to God." 278 years passed by, and in 1871 Captain Carlsen, a Norwegian, the first sailor who ever circumnavigated Spitzbergen, also circumnavigated Nova Zembla, and at Ice Haven, as Barendz had named his quarters, he found the hut still standing. For 278 years it had remained unvisited by man. The clock was hanging on the wall, just as in the picture. There were books on the floor just as they had been left, and there was a little pair of shoes belonging to a ship-boy, who nearly three centuries before had died and been buried in the winter.

Parry's celebrated voyage was also in the same seas. For his achievements he ranks with Franklin, though here he failed as Franklin partly did. *Par Nobile fratrum!* I could linger on the story long. But surely it must be a twice told tale to most of you, how after sailing by the West and to the North of Spitzbergen, Parry tried to carry out his bold and original idea of reaching the Pole by sledges, leaving his ship "Hecla" under the charge of Lieutenant Crozier, who afterwards died in Franklin's expedition. He set out with two flat-bottomed boats, 20 feet long and 7 broad, mounted on runners, which the moment they had to land on ice, came into play. June 1st, 1827, was the day he set out, and it was only after 61 days that they saw the Hecla again, having meanwhile got only 172 miles northwards by incredible exertions. Modern sledge parties would look on Parry's equipment as as clumsy and intolerable as Brown Bess would seem to a Martini Rifleman. And it was a frightful season too. The ice was all rotten on the surface, more

rain having fallen that summer than in the seven summers before. In fact the August of 1827 must have been uncommonly like the August of 1881. But in spite of having to do every mile several times over in order to get all their gear through the slush and the hummocks, they toiled on undauntedly till they found to their astonishment that they were making no progress or next to none, because the ice floes on which they were were drifting southwards as fast or faster than they went north. So they turned about and came safely home, having reached the highest point ever attained by civilised man till 1876.

Of Franklin's expeditions I shall not speak here. But I will take this opportunity of solving a difficulty which I believe was felt by the IVth Forms in reading a certain holiday task lately. Some of those who read how often Franklin and his men swallowed their old shoes seem to have wondered (1) how it was they had so many old shoes to swallow, and (2) how their stomachs which had stood so much or rather so little else, managed to get through such an enormous amount of blacking. The answer is that the shoes were made of Moose-skin and were not blacked, and therefore both numerous, and less lasting than our hobnailers, and also comparatively digestible.

One more memorable expedition was made in 1869—1870 in the seas between Spitzbergen and Greenland by Captain Koldewey in the *Hansa* and *Germania*. The *Germania* was a Steamer and it got as far as a grim cape, well called Cape Bismarck. But the *Hansa* was separated from her and had another fate. She was crushed in latitude $70^{\circ} 46'$, and her crew built a home out of the patent fuel on board her, on the ice floe. In that queer hut they passed Christmas and in two months the drift took the floe 400 miles south. They were at the end of November half-way between Greenland and Iceland. Then after Christmas the floe split and smashed their home, but they rebuilt it, and on January 3rd, were close to the Greenland coast, but owing to the broken ice between could not reach it. Spring passed. Summer came. The sun and the surge wore away their floe till it was only 100 yards broad. By May they had drifted 1100 miles in this weird fashion. But finally they got safe to Friedrichsthal, just on the other side of Cape Farewell, June 14th, 1870.

Now for a few words about the expeditions the other side of Greenland. John Davis, like so many of our old sea dogs, a Devon man, was the pioneer of this route. He didn't like the look of Greenland, for he says "the loathsome view of this shore and the irksome noyse of the yce was such as it bred strange conceites among us," but he was a gentle as well as a brave man, and one likes to read of him speaking of the Esquimaux as "gentle and loving savages" His last and most northern voyage was in 1587. William Baffin got farther than Davis in 1616. He it was who sighted

the entrance to Smith's sound, which he called after the first governor of the East India Company, Sir Thomas Smith, who was also the first governor of the Company of Merchant discoverers of the N.W. Passage. It lies between Cape Isabella on the West and Cape Alexander on the East coast, the distance between the two being a little over forty miles. For the next two centuries it was a mere *nominis umbra*, if it was so much as that, for even so late as 1818 Baffin's Bay was thought to exist only in the imagination of him who gave that sea its name. John Ross sighted Smith's Sound again in 1818, but he was more discreet than valorous, and left it to be supposed there was no outlet from Baffin's Bay to the North and West. In 1852 however Inglefield looked into the entrance of the Sound and saw it was really a channel to the North. In 1853 came Kane's heroic voyage and his marvellous escape in boats. Morton, his steward, saw what he thought was an open sea, but Hayes in 1851 found it to be merely an expansion of the channel called Kennedy by Kane. Up Kennedy Channel, Hall sailed in '71, 47 miles farther than Hayes reckoned he had reached in a sledge. The channel had narrowed greatly then and Hall called it Robeson Straits. It was navigable further on, but his vessel was nipped there at a point about 33 miles south of Parry's farthest. He wintered his ship more to the south and never got farther afterwards, and on November 8th he died. The *Polaris* got free but was again nipped so severely that the boats were got-out on the ice and when the ship righted a portion of the crew remained on the floe. On this floe like Koldewey's party they built a shelter and drifted down on it between 13 and 1400 miles till they were picked up by a sealing steamer, the *Tigress*. The *Polaris* also got safely home.

For this voyage the *Polaris* carried a memorable flag. It had originally been saved from the wreck of an United States sloop of war. It had been carried to the Antarctic regions by Wilkes. De Haven had it in his memorable drift in the ice down Wellington Channel and Lancaster Sound into Baffin's Bay, Kane had it when for the first time civilized men penetrated Smith's Sound. Hayes had it when he sighted the most northern point in the then known world. And lastly when Hall set out with the *Polaris*, Mr. Grinnell, the most liberal patron of Arctic Enterprise in America, presented it to him with the words "Now I give it to you Sir, take it to the North Pole and bring it back in a year from next October." Poor Hall, as we know, never brought it back, but I suppose his crew did and I should like to know if it sailed with the ill-fated *Jeannette*.

The last achievement in Smith's Sound was in 1875-6. How well I remember the Whit-Monday in 1875 when I went to see the two ships before they sailed. You'll see pictures of them by and bye. Suffice it here to say that Sir G. Nares wintered the *Alert* on the Western shore of Robeson

Channel in lat. $82^{\circ} 27'$ and next year in the Spring sent sledge expeditions which succeeded in reaching the highest point ever reached towards the Pole, i.e., $83^{\circ} 20' 26''$ just within 400 geographical miles of it; and in observing that Grinnell Land trended away so suddenly westwards that almost beyond doubt it is an island of which the Northern coast was then seen, and that the Greenland coast also seemed trending eastwards, so that there too the northern limits of the land were nearly reached.

It may help you to see what has been done in this direction if I say that Parry in 1827 advanced to 520 miles from the Pole, Hall to 533 miles from the Pole, and Nares to 460 miles from the Pole. So that it has taken us half-a-century to advance 60 miles. But what miles! A few years ago a man started with a wheelbarrow from the Land's End, I think, for the Scotch border, and that seemed a toilsome task enough. But, fancy marching with loads to which a wheelbarrow would be nothing, and not along a good high road, but over rough ice, strewn with blocks thicker far than the greywethers and many of them miniature hills!

I have thus briefly traced some of the chief expeditions on each side of Spitzbergen and each side of Greenland. A few words will complete the circuit of the unknown Sea, and will show you what has been going on in the Seas N. of Siberia lately in connection with the names of Payer, Legh Smith, Nordenskiöld, and the Jeannette.

Lieut. Payer sailed June 13th, 1872, from Bremerhafen (with Captain Carlsen on his ship), to discover a North East Passage. He did not discover it, but he did discover lands which in 1871 it had been thought probable existed between the 80th and 83rd parallels of latitude. He discovered an archipelago—lands which he called Zichy Land, McClintock Land, Hall Island, Salm Island, Wilczek Land, Crown Prince Rudolf Land, Petermann Land, Oscar Land, and a number of smaller islands. Oscar Land and Petermann Land stretch away Northwards in Latitude 83, and if they are large islands it is the fashion now to prophesy that this is the way the Pole will be ultimately reached, because it is easier to get along by shore ice than ice of the open fies. But people forget that Payer got to Franz Joseph Land not of his own will but by accident, and Legh Smith, who went to explore it, may have paid dearly for being too sanguine that he would find a passage there through the ice.

In July Payer doubled the North Cape and on the 25th reached the packed ice far more south than he had expected. In August he was at Barends Island off Nova Zembla, and in September the ice fies round them froze together, and they drifted helplessly northwards. From this deadly embrace the doomed ship never escaped, for though the following year the ice was often shattered it always re-joined. On the 28th of October the sun

disappeared and was seen no more for 109 days. Fine snow fell almost continuously and though it melted in summer, in the 2nd winter, '73—'74, it completely buried the ship. The summer of '73 was spent in vain efforts to saw the ship loose, but the floe was 5 to 7 miles in diameter in August, 1873, and they began that month to drift North again. On the 31st they saw land 14 miles to the North and at the end of October they were three miles off an island close to the land. All other considerations were thrown to the winds, and they crossed to it. The Island they named after the founder of the expedition, Captain Wilczek. There the ship remained, harbourless, but embedded in its floe and protected by icebergs all that winter. And there it remains I dare say to this day, for after the second winter Payer abandoned the ship in 1874, and in boats and sledges escaped first to Barendz Island, and then along the North Coast of Nova Zembla, across Barendz Sea to Lapland. Meanwhile they explored the new land they had discovered and which they had called collectively Franz Joseph Land. Masses of land intersected by numerous fiords, skirted by many islands, crowned by mountains from 2000 to 5000 feet high, with stupendous glaciers and vast plateaus covered with perpetual snow and ice—such are the features of a country more desolate even than Greenland. Let us hope Legh Smith has found bears as plentiful as Payer did, for plenty of bear's meats proved his surest remedy for scurvy, and let us hope he will be brought home safely by the expedition sent after him or, as I think probable, will meet it on his return home.*

Nordenskiöld is the Finlander famous as the first person who ever achieved the N.E. Passage, i.e., sailed across Barendz Sea and along the North Coast of Russia to Bering's Straits. He is a most enthusiastic Arctic Explorer, having been three times to Spitzbergen besides taking two pioneer voyages to prepare for his great attempt. The Captain of his Ship, the Vega, was Lieut. Palander and the crew were 30 all told. They sailed July 4th, 1878. On the 19th August they reached Cape Chelyuskin, otherwise the N.E. Cape, which had never before been doubled by a ship, though people had sledged round it long before, and in September for the first time they were stopped by ice near Cape Schelagskoi, 500 miles from Bering's Straits. Going into winter quarters at Koliutchin Bay they endured little of the hardship of Arctic travelling, for they were so far South as to have had, even on the shortest day, sunlight for four or five hours. On the 18th of July, '79 they got free of the ice and on the 20th of July entered the Pacific.

And now you may like to hear a little about the Jeannette. I was by no means clear as to her exact course till a file of the *New York Herald* was most kindly sent to me by Miss Cracroft, Sir John Franklin's niece.

* This anticipation has since been happily realised, Mr. Legh Smith having been met while returning in boats and brought home by Sir Allan Young.

The Jeannette was originally called the Pandora and it was in a queer fashion, I have been told, that Gordon Bennet of the *New York Herald* came to be her owner. Re-christened the Jeannette she left San Francisco July 8th, 1879, commissioned to explore the Polar Seas, and late in the month of August passed into Bering's Straits, having obtained dogs and drivers on the way, so that the crew numbered 33, all told. August 28th they rounded East Cape and heard news of Nordenskiöld from the natives, who led them to the place where that more fortunate traveller had wintered the year before. Their hearts must have swelled high as they found that he had made the N.E. Passage, and thought that with their splendid ship and equipment they might surpass even his success and reach the Pole. August 31st they headed for Wrangell Land, a mysterious land which Petermann, the German Geographer, had actually supposed to be joined to Greenland, but which we now know to be an island. On September 6th they entered a lead which they thought to be the division between the Siberian and American ice-packs, and that night were frozen in when 21 miles South South-west of Herald Island. A week later they tried to reach the island by sledges, but found water-lanes in the way and could not do so. Boats they dared not use as they found their ship was drifting with the ice as the wind blew. They had splendid skating, however, on ice as smooth as glass, to beguile the time, and, lest their ship should be blown over, (for the gales sometimes made her heel over to an angle of 12 or 15 degrees) tackle was fastened to the mast-heads with heavy blocks attached to ice-anchors 100 or 200 feet off. The floe was moving in a N.W. direction, and it was alarming as well as disappointing to be at its mercy, for great masses of ice were continually being forced up as the floe was jammed and squeezed in its drift, and at night great thundering sounds were often heard which heralded a complete change of the ice-scenery round them in the morning. So October passed. Early in November the ice began to break up with terrific noise, the dogs whining and howling dismally, and the ice floes tumbling to pieces with a deafening roar. The new-formed water-lanes shone like gold threads through the silver fields of ice, and the summits of the great blocks of uplifted ice flashed with prismatic splendours which their awe hindered them from appreciating. On November 23rd the floe split away from one side of the ship leaving her cradled on the ice on the other. On the broken floe which drifted off was an out-house they had built, with several dogs in it. Sixteen months later they met this out-house again much as they left it. A few days later the floe again closed in on the shelf where their vessel lay, and in the vice-like pressure the stout vessel groaned as if she were human. One great tongue of ice so jammed the port-beam that they thought it was all over, and stood on deck breathlessly watching for the end. But the noble little craft remained firm, and the great arm of crystal

under-ran the ship, crumbling as it went with a sullen roar which to their ears sounded like sweet music. At such moments the deck-planks would start from their beams, and their fastenings crack like rifle shots, and the cabin doors would become so jammed that ingress or egress was impossible. The dogs were kept harnessed and every man had his knapsack ready so as to start from the ship at a moment's warning. The sun deserted them November 10th, 1879, and they saw it no more till January 25th, 1880. Great gales blew, and in January the ship sprang a leak and for a year-and-a-half from that time they kept the pumps going. After five months' drift they found they had not moved 50 miles from the point where they had been frozen in. The summer of 1880 came and they began to drift back over their own tracks. They began to fear lest like the Flying Dutchman they were doomed to go on backwards and forwards for ever. The winter of 1880—81 passed much as the preceding one had done—in indescribable monotony. Spring found the ship still drifting in the same track. On June 10th, however, she slipped from the ice into sea-water again as easily as from the ways of a builder's yard. They were then in latitude 77. The same afternoon the ice crushed the vessel badly and the crew left her, Captain De Long remaining on board alone to spend the last few moments with his sinking vessel. By and bye the ice closed on her, then released her a moment, and as the hull sank closed again and caught her by the yards. For an instant she hung till the spars broke, and then down she sank carrying with her every vestige of her rigging. With eight sledges drawn by the men and a weight of 15,400 pounds to drag on them, and two lighter sledges hauled by dogs, the poor fellows set out, ill in health but yet full of hope. They marched due South over snow eighteen inches deep and ice full of fissures, over which they tried to make bridges with floating fragments. The first day they only made one mile, for they had to walk thirteen times over every yard of it in order to get all the loads together. Lieutenant Dannenhauer was almost blind and must have perished but for Mr. Melville, who stayed by him and when he fell into any of the fissures pulled him out. On July 12th they saw land. On the 20th they spent twelve hours in advancing one thousand feet, the ice drifting North as they pushed on over it southwards. Many of the men had blood-blisters on their feet which would not heal, and though, as the snow melted, travelling became easier, the pools of water kept them in shoes constantly wet through. They came within two miles of the shore only to be swept past it by the tide. Then the floe on which they were drifting struck the shore, and watching their time they jumped off. Thus they took possession of what they named Bennett Island, which you will not find in any map to which you have access, but which is a little north of New Siberia. On this island were many birds, and from

eating them everyone became ill, so that they were glad to return to pemmican. On August 4th, they were able to launch the boats, but were obliged to shoot some of the dogs. They steered south-west, making ten miles on some days but generally much less. On the 28th they again saw land and found they were drifting along the coast of Thaddecofsky, for the ice still hindered them from advancing south. On September 1st, they passed through the channel between New Siberia and Thaddeus Island. Then they made sail, but on the 12th one of the boats was stove in, and though they patched up the hole a gale came on and the seas broke over them, so that they fell to despairing and thought no human power could aid them. Then the Captain made signals from his boat for the three boats to separate, and they saw each other no more. Lieut. Dannenhauer was quite blind now, but his boat rode out the gale, which blew for four days, and on the 17th land was sighted. It was the Siberian coast, but so surf-tormented was the shore that for twenty-four hours they could not land. At night they succeeded in reaching the shore near the mouth of the Lena, and chewing their sealakin garments for food they lit a fire at once, but only to suffer excruciating pangs from sleeping with their feet near it. Then they met some natives, and the worst of their sufferings was over. Captain DeLong landed the same day, but only two of his party survived. The two men were called Noros and Ninderman. I wish I had time to tell you their pathetic story. When DeLong could march no farther he determined to send them for help. So he held service, for it was Sunday, on the Lena's banks, and then he sent them away. "All the men," says Noros, "shook hands with us and most of them had tears in their eyes." Collins was the last. He simply said "Noros, when you get to New York remember me." They seemed to have lost hope but they gave us three cheers. We told them we would do all we could do, and that was the last we saw of them." Or that anyone saw of them in life, for though Noros succeeded in reaching Melville it was too late, and when the latter arrived at the sad bivouac by the Lena, DeLong and all his men were lying dead. Nor has the third boat ever since been heard of.

After a story of such terrible suffering you may be surprised to hear that the average mortality of Arctic expeditions is not great. A man who takes part in them should be sound of wind and limb. He should be able to take kindly to ice *au naturel*. He must not mind losing a bit of toe or finger if he has to go a long walk. And he must look forward hopefully to the consumption of much blubber—raw. In short he must expect to rough it. But these conditions accepted and rigid discipline maintained, there is little more of pain and peril to be anticipated than is incident to all enterprises in which it is the sailor's lot to engage, while the precautions

necessary to ensure safety (for without such precautions Polar expeditions are mere insanity) are as wholesome experience for our young man-of-war'smen as anyone could desire. I hope the day will come when I or some far abler lecturer will be able to tell your Natural History Society how an English vessel or English explorer at last succeeded in reaching the North Pole.

MORE UN-NATURAL HISTORY.

READ BY F. E. HULME, ESQ., THURSDAY, JUNE 22ND.

SOME little time ago I gave myself the pleasure of reading a paper before this learned Society on some of the quaint beliefs that had clustered round divers birds, beasts and fishes. I was obliged to confine myself wholly to the animal Kingdom, though at the time I began my paper I had hoped to have said somewhat of the second great Kingdom of Nature. With your permission I propose to begin now where I then left off and to give you some necessarily slight and sketchy idea of the fancies held by our ancestors about some few plants.

The first book I take down from my book shelf is entitled "Miracles of Art and Nature, or a Brief Description of the several varieties of Birds, Beasts, Fishes, Plants and Fruits of other Countreys, together with several other Remarkable Things in the World, By R. B. Gent." The author's name thus modestly veiled is Burton, and the date of the book is 1678. In his preface he says—"I think there is not a chapter wherein thou wilt not find various and remarkable things worth thy observation," and this observation of his is strictly within the truth. He arranges his short chapters geographically, but in the most arbitrary way, not alphabetically, not according to the natural grouping together of the Countries of which he treats, nor indeed according to any settled method. In fact he is sufficiently conscious of this, for to quote his preface again, he says. "'Tis probable they are *not* so Methodically disposed as some hands might have done, yet for Variety and pleasure sake they are pleasingly enough intermixed." We open the book at random and find chap. XX, Castile in Spain; XXI, Norway; XXII, Zisca of Bohemia; XXIII, Assiria; XXIV, Quivira in California. Adopting his own random and hap-hazard way of going to work we will pluck from his quaint pages some few of his botanical facts and fancies. His opening chapter deals with Egypt, and in his description of the palm tree he refers to a very old belief that we may allow him to set forth in his own words—"It is the nature of this tree though never so ponderous a weight were put upon it not to yield to the burthen, but still to resist the heaviness, and endeavour to raise itself the more upward. For this cause planted in Churchyards in the Eastern Countreys as an Emblem of the Resurrection." A little further on in his description of Sumatra we read of "a tree whose Western part is said to be rank poyson and the Eastern part an excellent preservative against it," and of "a sort of Fruit

that whosoever eateth of it, is for the space of twelve hours out of his Wits." Travellers' tales have sometimes proverbially been difficult of belief and it must have been some such as these that procured them their evil report, for we read too that in this same island "there is a river plentifully stored with Fish, whose Water is so hot that it scalds the skin" and that "the cocks have a hole in their backs, wherein the Hen lays her Eggs and hatches her young ones." A few pages further on we read of a tree in Peru—"the North part whereof looking towards the Mountains, brings forth its Fruits in the Summer only; the Southern part looking towards the Sea, fruitful only in Winter." Our old author evidently delights in sharp contrasts: It is curious however that the Coca leaf which has within the last few years been highly commended for those who have exhausting exercise, is in this book of over 200 years old fully referred to—"the leaves whereof being dried and formed into little pellets are exceedingly useful in a Journey; for melting in the mouth they satiate both hunger and thirst and preserve a man in his strength and his Spirits in Vigour; and are generally esteemed of such sovereign use, that it is thought no less than 100,000 Baskets full of the leaves of this tree are sold yearly at the Mines of Potosia only. Another plant they tell us of, though there is no name found for it, which if put into the hands of a sick person will instantly discover whether he be like to live or dye. For if on the pressing it in his hand he look meery and cheerful it is an assured sign of his recovery, as on the other side of Death, if sad and troubled." A few pages further on we find ourselves at Sodom and the Dead Sea—"If but an Apple grow near it, it is by Nature such that it speaks the Anger of God: for without 'tis beautiful and Red, but within nothing but dusty Smoak and Cinders." This belief is a very ancient one. We find it for instance in the writings of Tacitus, and it has supplied moralists in all ages with an illustration; in "the Merchant of Venice," for instance, we find the lines "A goodly apple rotten at the heart. O, what a goodly outside falsehood hath!" and again in "Childe Harold,"—"Like to the apples on the Dead Sea's shore, all ashes to the taste." The apple has indeed entered largely into history and legend. According to some writers the forbidden fruit of Eden was a kind of apple and the *pomum Adami* in one's throat may be accepted as a record of the old belief. "The fruit of that forbidden tree, whose mortal taste brought death into the world, and all our woe." Our readers too will recall the golden apple of discord that created strife alike on high Olympus and amongst the sons of men and that led to the fall of Troy. On the other hand we read of the apple of perpetual youth in Scandinavian mythology, the food of the gods: and in the "Arabian Nights," of the apple of Samarkand that would cure all diseases. The apples of Istkahar were all sweetness on one side, all bitterness on the other, while Sir John Mandeville tells us that the pigmies were

fed with the odour alone of the apples of Pyban. Amidst this maze of fancy and legend it would perhaps be scarcely fair to even mention the more historic apple that fell at Woolsthorpe at the feet of Newton, and set his mind thinking on the problem of gravitation. At Crete our old Author, Burton, finds a plant called Alimos which it is only necessary to chew to take away all sense of hunger for a whole day, but this wonder pales before those of the Flora of Nova Hispania, the country we now call Mexico. "Amongst the Rarities of Nova Hispania, though there be many Plants in it of Singuler Nature, is mentioned that which they call Eagney or Meto, said to be one of the principal: a Tree which they both Plant and Dress as we do our Vines; it hath on it 40 kinds of leaves, fit for several uses; for when they be tender they make of them Conserves, Paper, Flax, Mantles, Mats, Shoes, Girdles and Cordage, upon them they grow divers prickles so strong and sharp that the people use them instead of Staws." What Staws may be we cannot say, so we must be content to know that Meto thorns make a very efficient substitute and are for all practical purposes as good as having the real thing. "From the top of the Tree cometh a Juice like Syrrup, which if you Seeth it will become Honey; if purified, Sugar; the Bark of it maketh a good plaister and from the highest of the Boughs comes a kind of Gum, a Sovereigne Antidote against poysons." The tree furnishes at once costume and confection, antidote and rope, and we can hardly wonder at the people of New Spain setting considerable store by it. Our book unfortunately is not illustrated or it would be curious to see the forms of the forty leaves: we can well imagine that a plant suggesting about equally by its foliage the rose, palm, bull-rush, buttercup, cactus, horse chestnut and thirty-four other plants would give our botanists some little difficulty before it got definitely assigned its just place.

Brazil, like Mexico, is a very large place and a very long way off, and two hundred years ago the Royal Mail Steam Packet Company was a thing of the far future, there was therefore abundant room for play of the imagination, thus we read of a kind of corn "which is continually growing and always ripe; nor never wholly ripe, because always growing" and of another plant that yields so sovereign a balm that "the very beasts being bitten by venomous Serpents resort to it for their cure." It is interesting amongst the other strange wonders, animal and vegetable, that are duly set forth, to come across a plant that must be very familiar to most persons, the sensitive plant, the *Mimosa sensitiva* of Brazil, though in his description of it our author cannot resist an added touch of the marvellous, imputing to it a power of observation that later writers would hesitate to confirm, for he says "the herb Viva when roughly touched will close the leaves and not open them again until the man that had offended it had got out of sight." We must not however devote more attention to "R. B. Gent," great as the temptation to do so may be,

but sally forth to pastures new, well persuaded that in the older books of travels, herbals, and so forth, we shall find superabundant material available to us. Before passing to these we may advantageously give a few lines to the English Dictionary of Henry Cockeram, as he certainly produces some extraordinary illustrations of unnatural history. The book was published in the year 1655, and did not profess to deal with scientific matters alone, but was, to use the author's own language, "an interpreter of hard English words, enabling as well ladies and gentlewomen, young scholars, clerks, merchants, as also strangers of any nation, to the understanding of the more difficult authors already printed in our language, and the more speedy attaining of an elegant perfection of the English tongue." Amongst these hard English words sadly needing an interpretation we will select but five as a sample of the whole. "Achemedis, an herb which being cast into an army in time of battle causeth the soldiers to be in fear." This probably would be some kind of runner. "Anacramseros, an herb, the touch thereof causeth love to grow betwixt man and man." "Hippice, an herb borne in one's mouth, keeps one from hunger and thirst." "Ophyasta, an herb dangerous to look on, and being drunke, it doth terrifie the inside with a sight of dreadful serpents, that condemned persons for fear thereof do kill themselves." "Gelotaphilois, an herb drunk with wine and myrrh, causeth much laughter."

Amidst the mist of error some few men declined to believe quite all that they were told but exercised for themselves the right of individual judgment. The book we have just referred to was published, as we have seen, in the year 1655, and abounds in strange imaginings, yet five years before this we find a still better known book "the Pseudodoxia Epidemica, or Enquiries into very many Received Tenants and commonly Presumed Truths" of Dr. Browne. The list of commonly presumed truths he ventures to dispute is a very long one and includes such items of faith as that a diamond is made soft if placed in the blood of a goat, that a pail full of ashes will contain as much water as it would without them, that the two legs on one side of a badger are shorter than the two on the other side, and so on. As he approaches the vegetable kingdom he prefaces his remarks as follows—"We omit to recite the many vertues and endless faculties ascribed unto plants which sometimes occur in grave and serious authors, and we shall make a bad transaction for Truth to concede a verity in half. Swarms of others there are, some whereof our future endeavours may discover; common reason I hope will save us a labour in many whose absurdities stand naked in every eye, errors not able to deceive the Emblem of Justice and need no Argus to descry them. Herein there surely wants expurgatory animadversions whereby we might strike out great numbers of hidden qualities, and having once a serious and conceded list we might with more encouragement and safety attempt their Reasons."

On turning to the list of "vertues" in any old herbal we find, as Browne says, endlesse faculties ascribed and many of them of a character that would, we should have imagined have been, during even the darkest ages, difficult or impossible of credence. Thus in Gerarde's herbal published in 1633, we find amongst our British plants one available "against the biting of the Sea-dragon," two more "a remedy against the poyson of the sea-hare," one, against "vaine imaginations," another "an especial remedy against the nightmare," and no less than thirty-eight preservatives "against the bitings of serpents." We will however confine ourselves to three illustrative instances of the way in which the author of these enquiries into various received beliefs proceeds to demolish them. He says in the first place that "many things are delivered and believed of plants wherein at least we cannot but suspend. That there is a property in Basil to propagate scorpions and that by the smell thereof they are bred in the brains of men is a belief much advanced by Hollerius, who found this insect in the brains of a man that delighted much in this smell. Wherein besides that we finde no way to conjoin the effect unto the cause assigned herein the moderns speak but timorously, and some of the Ancients quite contrarily. For according unto Oribasius, physitian unto Julian, the Africans, men best experienced in poisons, affirm whosoever hath eaten Basil although he be stung with a Scorpion shall feel no pain thereby; which is a very different effect, and rather antidotally destroying than promoting its production." Pliny and other ancient writers mention the old belief that the bay-tree, the tree of Apollo, was a preservative against thunder, or rather against lightning, hence Tiberius and some other of the Roman Emperors wore a wreath of bay as an amulet, and in an old English play we find the lines

"Reach the bays,
I'll tie a garland here about his head
'Twill keep my boy from lightning."

Brown discourses on the point as follows—"That Bayes will protect from the mischief of lightning and thunder is a quality ascribed thereto, common with the fig-tree, eagle, and skin of a seale. Against so famous a quality Vicomercatus produceth experiments of a Bay-tree blasted in Italy, and therefore although Tiberius for this interest did wear a Laurell about his temples yet did Augustus take a more probable course, who fled under arches and hollow vaults for protection." A most un-imperial picture this, great Caesar deserting his throne and shutting himself up in his wine-cellar when he heard the distant rumbling of the coming storm. "If we consider the three-fold effect of Jupiter's Trisulc, to burn, discusse, and terebrate, and if that be true which is commonly delivered, that it will melt the blade yet passe the scabbard, dry up the wine yet leave the hog's head entire, though it favour the

amulet it may not spare us; it will be unwise to rely on any preservative, 'tis no security to be dipped in Styx or clad in the armour of Ceneus."

The Mandrake, a plant belonging to the same natural order as the deadly night-shade, henbane, and thorn apple, had in the middle ages many mystic properties assigned to it. The roots are often forked, and when either by nature or art they could be supposed to roughly resemble a man it was looked upon as a talisman securing good fortune to its possessor. The victories of the Maid of Orleans over the English were ascribed to her possession of a mandrake root. Gerarde, writing in the year 1633, says that the root is long, and thick and divided into two or three parts, but as to its resemblance to a man "it is no otherwise than in the roots of carrots, parsnips and such like forked or divided into two or more parts, which nature taketh no account of. There hath been many ridiculous tales brought up of this plant, whether of old wines or some runnagate Surgeons or physicke-mongers I know not, but sure some one or more that sought to make themselves famous and skilful above others were the first broachers of that error. They adde further, that it is never or very seldome to be found growing naturally but under a gallows.* They fable further and affirme that he who would take vp a plant thereof must tie a dog there unto to pull it up, which will giue a great shreeke at the digging vp, otherwise if a man should do it he should surely die in short space after. All of which dreames and old wines fables you shall from henceforth cast out from your books and memory, knowing this that they are all and euery part of them false and most untrue, for I my selfe and my seruants also have digged up, planted and replanted very many and yet could neuer perceiue shape of man. But the idle drones that have little or nothing to do but to eat and drink have bestowed some of their time in carving the roots of Brionie, which falsifying practice had confirmed the error amongst the simple and unlearned people who haue taken them upon their report to be the true Mandrakes." Parkinson in like manner in his "Theater of Plants" published in 1640, writes, after describing the plant, "those idle forms of the mandrakes which have beene exposed to view publikely both in ours and other lands and countries are utterly deceitful, being the work of cunning knaves, onely to get money by their forgery: do not misdoubt of this relation no more than you would of any other plant set downe in this booke, for it is the plaine truth whereon everyone may relie." The cry of the mandrake is several times referred to by Shakespeare and others of our poets, thus in "Romeo and Juliet" we get the line "shrieks likes mandrakes torn out of the earth" and in the second part of "King Henry VIth," Suffolk exclaims

* "It is supposed to be a creature having life, engendered under the earth of some dead person, put to death for murder."—Thomas Newton "Herball to the Bible."

"Would curses kill, as doth the Mandrake's groan."

Dr. Browne, in his gallant crusade against popular errors, says that the resemblance of the mandrake to the human form "is a conceit not to be made out by ordinary inspection, or any other eyes than such as regarding the clouds behold them in shapes conformable to pre-apprehension," and as to the danger of gathering the plant, he justly holds it "a conceit not only injurious unto truth and confutable by daily experience, but somewhat derogatory to the providence of God: That is, not only to impose so destructive a quality on any plant, but conceive a vegetable whose parts are useful unto many should in the only taking up prove mortall unto any. To think he suffereth the poison of Nubia to be gathered, yet not this to be moved. That he permitteth arsenick and minerall poisons to be forced from the bowells of the earth, yet not this from the surface thereof. This were to introduce a second forbidden fruit and inhance the first malediction; making it not only mortall for Adam to taste the one, but capitall unto his posterity to eradicate the other." The orthodox way of plucking up the mandrake, was to stand to the windward of it and, after drawing three circles round it with a naked sword, to dig it up with one's face looking to the west; the shrieks that would follow were in any case a trial to weak nerves, and at an earlier period were held to be fatal to the hearer. Philip de Thaun gives the following stratagem as the only available way of becoming the possessor of it. "The man who is to gather it must fly round about it, must take great care that he does not touch it, then let him take a dog and let it be tied to it, which has been close shut up, and has fasted for three days, and let it be shewn bread and called from afar. The dog will draw it to him, the root will break, it will send forth a cry, and the dog will fall down dead at the cry which he will hear. Such vertue this herb has that no one can hear it but he must always die, and if the man heard it he would directly die. Therefore he must stop his ears, and take care that he hear not the cry lest he die, as the dog will do which shall hear it. When one has this root it is of great value for medicine, for it cures of every infirmity except only death, where there is no help." The office of the herbalist was no sinecure when such a task could be expected of him, as great care had to be exercised not to touch the plant the tying up of the dog to it must have been particularly risky, and the consequences of the dog making a premature rush for the bread before the man had time to stop his ears were especially alarming. The writings of De Thaun are full of interesting matter, but his great object was to see in nature figures and symbols of religious truths, hence his narratives have often a somewhat forced character. Thus he tells us that "in India there is a tree of which the fruit is so sweet that the doves of the earth go seeking it above all things, they eat the fruit of it, seat themselves in the tree, they are in repose as long

as they are sheltered by it. There is a dragon in the earth which makes war on the birds, the dragon fears so much the tree, that on no account dare it approach it or touch the shadow, but it goes round at a distance, and, if it can, does them injury. If the shadow is to the right then it goes to the left, if it is to the left the dragon goes to the right. The doves have so much understanding which are above in the tree when they see the dragon go all around, which goes watching them, but it does them no harm, nor will they ever have any harm as long as they are in the tree, but when they leave the tree and depart, and the dragon shall come then it will kill them. This is a great meaning, have it in remembrance." This Indian tree stands not obscurely for the Saviour of the world, while the doves are his faithful ones sheltered in him from the wiles of the Evil one. When we read story after story all equally *apropos*, we cannot help feeling that a pious fraud has now and then been indulged in, and the comely whole has been attained by a little judicious pruning in one direction, and a little forcing in another, and thus we lose faith in them at least as examples of the current beliefs of our forefathers.

In the South Kensington Museum may be seen a picture by Francis Danby, bearing the title of "the Upas tree of the Island of Java." The whole picture is exceedingly dark, but one can just discern in the centre of it the form of a tree, and around this are human bodies and skeletons. The myth of the upas has been created on the very smallest data, and furnishes a striking example of how great a structure of error, not to say gross and wilful exaggeration, can be reared on a basis of truth. The neighbourhood of the tree is unhealthy, not on account of any thing in the tree itself, but because it grows in the hot and humid valleys of Java, rank with malaria and fever. A Dutch physician, named Foersch, published in 1783, a narrative of his visit to the island, and amongst his wild statements we find that where the upas grows "not a tree or blade of grass is to be found in the valley or the surrounding mountains, not a bird, beast, reptile, or living thing lives in its neighbourhood." He adds that "on one occasion 1,600 refugees encamped within 14 miles of it, and all but 300 died within two months:" this might easily arise from the malarial vapours, but his picture of the tree standing in the midst of the desolation it had itself created is utterly at variance with the facts. So far from it being the case that nothing prospers in its neighbourhood, it is found in the midst of the rich vegetation of the tropics, while the birds perch in its ample branches, and the wild beasts prowl beneath them. So far is it from being the case, to quote one of our own poets, that "Fierce in dead silence on the blasted heath fell upas sits, the hydra tree of death,"—the last relic of the marvellous is gone, when we recall the fact that thousands of holiday-makers have passed harmlessly through the hot-houses at Kew, where a specimen of

the plant may be seen, and that the refugees from London more or less permanently encamped within a mile or two of it have so far escaped damage from its proximity. The upas belongs to the same family as the invaluable breadfruit and cow-tree, but instead of possessing their beneficent properties yields, when wounded, a thick milky fluid of a very poisonous nature, and which is employed by the natives on their arrows and spear-heads with deadly effect.

The first published account of the Upas tree will be found in De Brys "India Orientalis," but the scanty particulars of the earlier author become considerably amplified in Sir Thomas Herbert's book of travels, published in London in the year 1634 and entitled "Relations of some yeares Travaile." A little later on, in 1688 we find the tree again referred to in the "Description historique du Royaume de Macassar" of Father Gervaise. The author who had really resided in Macassar for several years affirms that the mere touch or smell of some of the poisons produced by the natives is sufficient to produce death, and one of the most deadly of these was said by him to be produced from the sap of the Upas. He tells us that arrows dipped in this juice were as fatal in their effects twenty years afterwards as at their first preparation. In Kœmpfer's book, published in the year 1712, we have the plant again described; a large mixture of fable is at once apparent, but much of this he gives on the authority of the natives, and he takes occasion to express his strong doubts of their veracity. According to him, or them, the collection of the sap is attended with imminent peril, for not only must the seeker after the tree penetrate far into places infested with wild beasts, but he must, when he has found the object of his search, be careful to pierce it on the side from whence the wind blows, or he would quickly be suffocated by the noxious effluvia given forth when the tree is wounded.

"Lo! from one root, the envenomed soil below,
A thousand vegetative serpents grow;
In shining rays the scaly monster spreads
O'er ten square leagues his far diverging heads;
Or in one trunk entwists his tangled form,
Looks o'er the clouds and hisses in the storm.
Steeped in fell poison, as his sharp teeth part,
A thousand tongues in quick vibration dart;
Snatch the proud eagle towering o'er the heath,
Or pounce the lion, as he stalks beneath;
Or strew, as marshall'd hosts contend in vain,
With human skeletons the whitened plain."

Apart from the evil influence exerted on Europeans by climatic and miasmatic drawbacks, the mountain of mystery that has been reared around the dread

name of Upas has but little foundation in fact. Its juice is very plentifully yielded and is of a virulently poisonous character and even its smell is injurious. In clearing ground near the Upas the natives dread to approach it on this account, but unless the trunk is severely wounded or the tree felled the injurious effects are in the imagination only, and the tree may be approached or ascended with impunity. The Upas is one of the largest of the forest trees of Java, and it is surrounded as other trees are with the usual sturdy vegetation of the tropical wilderness.

In Persia we are told there is a plant, the Kerzereh flower, that loads the air with deathly odour, and that if a man inhales the hot south wind that passes over these flowers during June and July it kills him. Moore, in his Poem of "the Veiled Prophet of Khorassan" alludes to this belief in the lines,—

"With her hands clasp'd, her lips apart and pale,
The maid had stood, gazing upon the veil,
From whence these words, like south winds through a fence
Of Kerzrah flowers, came filled with pestilence."

Another article of faith with our ancestors was the goose-tree or Barnacle tree. Gerarde, for example, in his history of plants gives an illustration of it in all good faith, a branch bearing barnacles and by its side a barnacle goose. Following however the plan we have adopted throughout of going directly to the fountain-head, Gerarde shall give us his own description of this wonder of Nature. We may, however, point out before doing so that the error arose from a near resemblance of two distinct words suggesting that there must be an identity of nature in the things so named. A common kind of shell was in the middle ages called *pernacula* while the Solan goose, in France called the barnache, was the *bernacula*. Both words being popularly corrupted into barnacle it was natural that the two things should be considered as identical. Gerarde saves this crowning wonder until the end of his book, and then discourses as follows concerning it—"Hauing tranuelled from the grasses growing in the bottom of the fenny waters, the woods, and mountaines, euen vnto Libanus it selfe; and also the sea, and bowels of the same, wee are arriued at the end of our Historie: thinking it not impertinent to the conclusion of the same, to end with one of the maruells of this land (we may say of the world). The historie whereof to set forth according to the worthinesse and raritie thereof would not only require a large and peculiar volume, but also a deeper search into the bowels of nature than mine intended purpose wil suffer me to wade into, my sufficiency also considered; leauing the historie thereof rough hewen unto some excellent men, learned in the secrets of nature, to be both fined and refined: in the meantime take it as it falleth out, the naked and bare truth, though vnpolished. There are found in the North parts of

Scotland and the Islands adiacient, called Orchades, certain trees whereon do grow certaine shells of a white colour tending to russet, wherein are contained little liuing creatures, which shells in time of maturitie do open, and out of them do grow those little liuing things, which falling in the water do become fowles, which we call Barnakles; in the North of England trant geese, and in Lancashire tree geese; but the other that do fall vpon the land perish and come to nothing. Thus much by the writings of others, and also from the mouths of people of those parts, which may very well accord with truth.

But what our eyes have scene and hands haue touched we shall declare. There is a small Island in Lancashire called the pile of Foulders, wherein are found the broken pieces of old and bruised ships, some whereof have been cast thithor by Shipwracke, and also the trunks and bodies with the branches of old and rotten trees cast up there likewise; whereon is found a certain spume or froth that in time breedeth vnto certain shels in shape like those of the Muskle, but sharper pointed and of a whitish colour, wherein is contained a thing in forme like a lace of silke finely wouen as it were together, one end thereof is fastened vnto the belly of a rude masse or lump, which in time cometh to the shape and forme of a Birdc. When it is perfectly formed the shell gapeth open and the first thing that appeareth is the foresaid lace or string; next come the legs of the bird hanging out, and as it groweth greater it openeth the shell by degrees til at length it is all come forth and hangeth onely by the bill; in short space after it commeth to full maturitie and falleth into the sea, where it gathereth feathers and groweth to a fowle bigger than a Mallard and lesser than a goose, hauing blacke legs, and bill and beake, and feathers blacke and white spotted in such manner as is our magpie, which the people of Lancashire call by no other name than a tree gooso: which place aforesaid and all those parts adioining do so much abound therein that one of the best is bought for three pence. For the truth hereof, if any doubt, may it please them to repaire unto me, and I shall satisfie them by the testimonie of good witnesses.

Moreover it would seeme that there is another sort hereof; the historie of which is true and of mine owne knowledge: for traouelling vpon the shore of our English coast betweene Douer and Rumney, I found the trunk of an olde rotten tree, which (with some helpe that I procured by fishermen's wives that were there attending their husbands returne from the sea) we drew out of the water vpon dry land: vpon this rotten tree I found growing many thousands of long crimson bladders, in shape like vnto puddings newly filled, which were very clear and shining: at the nether end whereof did grow a shell fish fashioned somewhat like a small Muskle, but much whiter, resembling a shell fish that groweth vpon the rokes about Garnsey and Garsey, called a lymptit. Many of these shells I brought with me to London,

which after I had opened I found in them living things without form or shape: in others which were nearer come to ripeness I found living things that were very naked, shaped like a bird: in others the birds couered with soft downe, the shell halfe open and the bird ready to fall out, which no doubt were the fowles called Barnakles. I dare not absolutely avouch euery circumstance of the first part of this history concerning the tree that beareth those buds aforesaid, but will leave it to a further consideration, howbeit that which I have seen with mine eyes and handled with mine hands, I dare confidently avouch and boldly put down for veritie.

They spawn as it were in March and Aprille: the geese are formed in May and June and come to fulnesse of feathers in the moneth after.

And thus hauing through God's assistance discoursed somewhat at large of Grasses, Herbes, Shrubs, Trees, and Mosses, and certain Excrescences of the earth, with other things more incident to the historie thereof, we conclude and end our present volume with this wonder of England. For the which God's name be ever honored and praised."

We extract the foregoing from the first edition of "Gerarde's Historie of Plants," published in 1597. After his death Thomas Johnson, "Citizen and Apothecarie of London" brought out another edition in 1633, and he adds the following note to Gerarde's statement:—"The Barnakle, whose fabulous breed my Author here sets downe, and diuers others haue also delieured, were found by some Hollanders to haue another originall, and that by egges, as other birds haue; for they in their third voyage to finde out the North East passage to China and the Moluccos about the eightieth degree and eleven minutes of Northerly latitude, found two little islands, in the one of which they found abundance of these geese sitting upon their egges, of which they got one goose and tooke away sixty egges."

Parkinson, in his "Theater of Plants," published in 1640, gives a picture of a barnacle tree growing by the sea shore, and several geese swimming beneath it, at the end of the description of the 14th tribe of plants, "Marsh Water, and Sea Plants, with Mosses and Mushromes."

Though the insertion of the wood cut would give one at a casual glance the impression that he was a believer his comments are sufficiently indicative of his state of mind. "To finish this treatise of sea plants let me bring this admirable tale of untruth to your consideration, that whatever hath formerly beene related concerning the breeding of these Barnakles to be from shels growing on trees, &c. is utterly erroneous, their breeding and hatching being found out by the Dutch and others in their navigations to the Northward, as that third of the Dutch in Anno 1536 doth declare." As Gerarde's book was published after the Dutch narrative, we can only conclude that he either

had not seen it or that he is one more illustration of the old saying that "A man convinced against his will, remains the same opinion still."

In Munster's *Cosmography*, a book which was several times reprinted between 1550 and 1570, we find an illustration of the wonderful goose-yielding tree. Munster discourses as follows on the matter—"In Scotland are found trees, the fruit of which appears like a ball of leaves. This fruit, falling at its proper time into the water below, becomes animated and turns to a bird which they call the tree-geese. This tree also grows in the island of pomona, not far distant from Scotland towards the north." Saxo Grammaticus, another old cosmographer, also mentions this tree. Aeneas Sylvius notices it too; he says "We have heard that there was a tree formerly in Scotland, which growing by the margin of a stream produced fruit of the shape of ducks; that such fruit, when nearly ripe, fell, some into the water and some on land. Such as fell on land decayed, but such as fell into the water quickly became animated, swimming below, and then flying into the air with feathers and wings. When in Scotland, having made diligent enquiry concerning this matter of King James, we found that the miracle always kept receding:—This wonderful tree is not found in Scotland but in the Orcadian isles." Aeneas Sylvius, afterwards better known to the world as Pope Pius II, visited Scotland in the year 1448. His book is in the Latin tongue. William Turner, one of the earliest writers on Ornithology, describes the Bernacle goose as being produced from "something like a fungus growing from old wood lying in the sea." He quotes Giraldus Cambrensis as his authority for the statement, but says he, "as it seemed not safe to popular report, and as, on account of the singularity of the thing I could not give entire credit to Giraldus, I, when thinking of the subject of which I now write, asked a certain clergyman, named Octavianus, by birth an Irishman, whom I knew to be worthy of credit, if he thought the account of Giraldus was to be believed. He swearing by the gospel, declared that what Giraldus had written about the generation of this bird was most true; that he had himself seen and handled the young unformed birds, and that if I should remain in London a month or two he would bring me some of the brood." In Lobel and Pena's "*Stirpium Adversaria Nova*," published in London in 1570, there is a figure of the "*Britannica Concha Anatifera*" growing on a stem from a rock, while beneath, in the water, ducks are swimming about. In his description the writer refers to the accepted belief in such a bird but declines expressing an opinion of his own until he shall have had an opportunity of visiting Scotland and judging for himself. Ferrer de Valcebro, a Spanish writer who wrote a book on birds * in 1680, tells the story of the production from a tree of a bird he calls the Barliata,

* "El Gobierno general hallado en las Aves."

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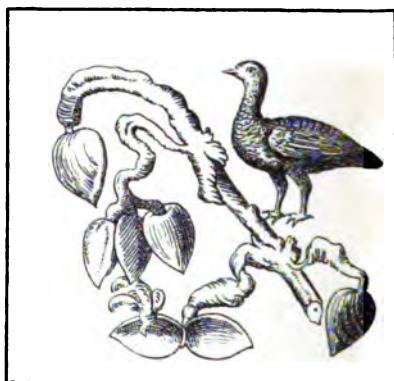
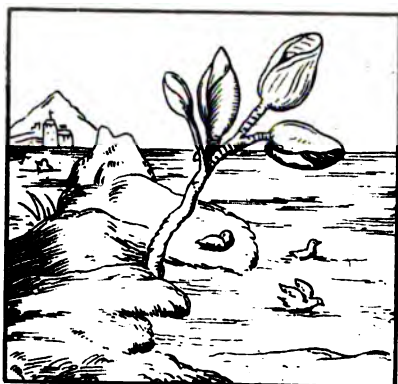
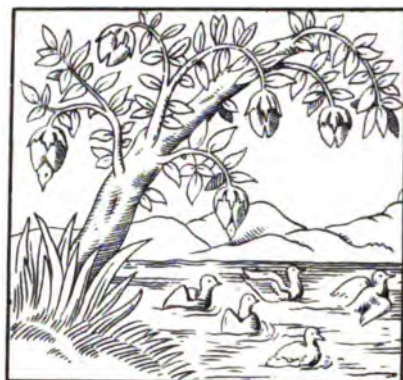
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and lectures his countrymen soundly at their want of belief and more than insinuates that it is not so much a want of faith really as a contemptible jealousy because the wonder is not found on Spanish soil.

We should have been glad to have dipped into that quaint old black letter treatise of the year 1557, the "Joyfull newes out of the new founde world, wherein is declared the rare and singular vertues of diuerse and sundry herbes, trees, oyles, plantes, and stones," by Dr. Monardus of Seville, and dwelt for awhile on "the most excellent hearbe Escuecomera," and others almost equally worthy of regard if only time would allow.

We have said nothing of the fern seed that makes its bearer invisible, a belief handed down to us by Shakespeare and other old writers; nor of "the hindering knot grass," nor of the immortal amaranth, "a flower which once in Paradise, fast by the tree of life, began to bloom, but soon for man's offence to Heaven removed." The legend of the quivering aspen goes untold, and the virtues of hemp seed, and the shrew ash must likewise remain here unchronicled, for the field open to us is boundless, and the difficulty indeed is to know how to stop. In pity to my hearers I will endeavour to overcome that difficulty, for I can well understand that though I may be able to get easily together the materials for a dozen such rambling papers as the present, my audience would much prefer to have this wealth of materials by instalments.

ILLUSTRATIONS.

Nos. 1, 2, and 3 are all examples of the barnacle goose tree, the first is from Munster's book, the "cosmography;" the second, from Parkinson's "Theatrum Botanicum," and the third, from Gerardes "Historie of plants." The fourth illustration, the unyielding palm tree, is taken from the frontispiece of the "Eikon Basilike, or Portraiture of his Sacred Majestie in his Solitude and Sufferings;" 1649.

ROTIFERS.

BY DR. HUDSON.

There was a large gathering in the Bradleian on Saturday, March 11th, to hear Dr. Hudson, of Clifton, who is perhaps, next to Mr. Gosse, the greatest living authority on this family of microscopic creatures, deliver his lecture to the Natural History Society. The subject was well calculated to stimulate curiosity, and the lecturer thoroughly caught his audience by his amusing comments on what he showed them, and striking interpretations of the marvels these little animals exhibit. One of the chief charms of Natural History lies in the fact that the merest tyro in its service seems to find himself carried in a trice to the very confines of fairy-land, and one peep through the microscope reveals a whole universe of hitherto unsuspected neighbours.

See through this air, this ocean, and this earth,
 All matter quick and bursting into birth!
 Above how high progressive life may go!
 Around how wide, how deep extend below!

There is a spell hanging about the very name of Rotifer. How is it written? What does it mean? Transformed into wheel-animalcule, it is more puzzling still and sounds uncanny. Well, few could have heard Dr. Hudson without having some of their queries finally set at rest, and withal their curiosity keenly quickened. His words seemed to set before the imagination a boundless field for research, a world where nothing is strange, and mundane experience wholly at fault, and a study where true devotion and energy can win lasting fame.

The lecturer was particularly successful in ushering his hearers into this romantic clime without any of the pseudo-scientific jolts and jars usual in the transit. The gas disappeared and we settled down for our travel, and as the curtain drew aside before each picture, we woke—if counter attractions proved not too strong—to a vision of sunshiny lands peopled with fantastic shapes and heard of things scarce dreamt of in our philosophy. In Rotifer-land things are not what they should be, and to expect such a thing is the attribute of no true student of Nature. These small creatures, some fiftieth of an inch in length, swim, but it is with their hair: they bite, but their jaws lie in their stomachs, and beat on an anvil like sledge-hammers; they see, but with one eye in their necks, and that a red one; they work and build, but it is with their noses and hair. They roam freely about, or prefer to creep; they jump and dart, or take to a quiet and settled life in a house manufactured round about themselves out of the debris of their food. Some are encased in transparent shells of glittering mail, others wear no armour, and others live in clear or opaque tube-dwellings. Some are vegetarians, others carnivorous in their tastes: above all there is here a body politic where women monopolise

life and its emoluments, shouldering their partners out of the struggle into a mean and brief existence, tolerated only for the sake of future generations,

Sans teeth, sans eyes, sans taste, sans everything.

By the aid of cleverly constructed diagrams proof was given of many of these marvels, and there was a peculiar charm in listening to Dr. Hudson's modest references to little incidents in their first observation or discovery by himself, which spoke of perseverance rewarded or of difficulties surmounted with triumph. His pictures were cut out of thick opaque paper, the apertures covered with tissue paper suitably tinted and shaded with the brush, and the whole fastened on a frame and set in front of a strong light in a box behind, so that the concentrated effect was most vivid. First we saw a typical species, *Braehionus rubens*, a sort of portly pitcher with a hairy rim, and bearing on either side in front the peculiar semicircular ciliated lobes, whose apparent revolutions, as the hairs rise and fall into and out of focus, give the family its name. This monster served as the text for some remarks on the internal economy of these creatures. As transparent as in the landscape of a microscope was seen the scaly envelope, like the shell of a tortoise armed with a wreath of flexible spines—the internal jaws above a most aldermanic stomach, with a pair of attendant glands—the vessels for keeping up a constant ebb and flow of water in the cavity of the body—and lower down the ovary, two eggs from which were seen dangling like John Gilpin's two stone bottles on either side of the creature's tail. The latter is a flexible and telescopic apparatus, reminding one somewhat of an elephant's trunk, capable of secreting a gum which attaches at its owner's will to water plants or other objects, even such as a smooth glass slide. *Hydatina senta* was a rough creature whose tastes are cannibalic and his appetite for *Euglena viridis* has been compared to that of a codfish for sprats. His green stomach revealed the terrible tale. Another species, *Pedalion mirum*, Dr. Hudson's own discovery, is as disturbing to orderly minds as a white crow or a black swan in the history of science, for unlike its fellows it has developed limbs, six in number, one being of abnormal length, and resembles a large water-flea; the lecturer also found the diminutive male though he is only allowed a quarter of an hour's existence. The common kind, *Rotifer actinurus*, to be found in every tank or gutter-bed, must not be omitted. It is enabled to resist the effects of long drought, and can be kept for years as dry to all appearance as dust. Myriads of these temporary mummies must be carried in this state through the air, and one drop of water restores them to full activity. Strange to say the male is at such a discount in this species that he has never yet been seen. We would fain recal points of interest in the life of *Cecistes* or of the *Limnias*, which love to infest Hornwort and other plants with their brown tubes—of *Melicerta*, the tiniest perhaps of bricklayers—of the socially minded *Conochilus*, where one

shield encloses a whole colony, adherent by their tails, or of *Lacinularia* where the individuals stand out like rays of a star from the point to which they cluster. Lastly came the voracious *Floscules* with their umbrella-like mouths, among the most beautiful of the genus, but not always the strictest observers of temperance and propriety in the matter of food, and finally the rare *Stephanoceros*, the gem of all, with its crown of five tapering tentacles, with their tufts of cilia.

The lecturer also alluded to many interesting problems suggested by these animals. There is a grand difficulty on the subject of their classification. It is generally agreed that they belong to the Articulate series, though formerly owing to their small size ranked with the Infusoria. But whether in this series they should be classed with the Crustacea such as Lobsters and Crabs, or as Prof. Huxley argues, with the worms or Annelids, is very hard to say. That some species possess limbs seems to militate against the latter theory. It is clearly much easier to say what a Rotifer is not than what it is, as there is scarcely any one feature, not even the typical wheels, constant throughout the group.

Another point was the presence of parasites even in these little animals. Like the tiny water Hydras they often afford a happy hunting ground to such unwelcome but apparently not injurious guests. Specimens occur infested with *gregarinae*, the curious animal so often found in the intestines of worms and insects, possibly only a phase in the life-history of some higher organism.

Finally we would add a word about the microscope, hints for the use of which Dr. Hudson repeatedly gave. All the wonders heard on Saturday are but a tithe of the marvels of its enchanting land. The lecture was but as if a member of the ornithological section were to discourse on swallows, or of the Botanical on nettles. We know of many a pond hard by our dwellings, such as the lecturer described, capable of binding any one initiated into its secret, with an indissoluble spell. There are few who seek this initiation, for its charms grow only with growing knowledge; once sought, however, it is never repented of or laid aside.

F.

FORTIFICATION.

READ BY G. W. RUNDALL, ESQ., OCT. 28TH.

FORTIFICATION in some form or another is as early as fighting itself, and the earliest form was the most natural, the one that amid all changes has survived to the present day. The natural protection against weapons was an earthen bank, high enough at least to cover a man lying down behind. Hence the term "parapet" (Italian *para*, against; *petto*, breast). (Relics of such intrenchments are found so commonly everywhere that it is only necessary to mention, for our immediate interest, the earthworks scattered so plentifully over our own downs). But as the lying position is not so convenient either for shooting or for defence against assault as the standing, the embankment was made high enough to protect a man standing, and then raised even a little higher, so as to cover him *completely*.

The earth thrown out to make the parapet necessarily forms a trench, which makes an additional defence on the outside. So here we have the rudimentary fortification—a ditch made as deep as possible in the time at disposal, and a bank correspondingly high. But if the bank is above the height of a man, he must be enabled to fire over the crest by means of a step made along the interior: this is called *the banquette*. Standing on it the soldier directs his aim; and by stepping down after the shot is completely protected. ["Rampart" generally means the lower, 'parapet' the higher part of the embankment.] Though these form the elements of all fortifications, they are in themselves insufficient to withstand a determined attack in superior force; hence further obstacles are necessary, and the science of fortification largely consists in the development of these additional hindrances. The principal and universal one is *the glacis* or sloping approach to the top of the ditch, so contrived that the slope shall be as nearly as possible a prolongation of the *superior slope* or *plongée* of the parapet. Its object is (a) to keep the enemy under fire for as long a time as possible; hence it is quite clear of trees and obstructions to the view; (b) it increases the height of the ditch. (Fig. 3).

Other minor obstacles are employed such as *Abattis* or trees with branches lopped and sharpened pointing towards enemy. *Chevaux de frise*—*wire entanglements*—*crows' feet*—*trous de loup*.

How effectively in different forms obstacles like these were employed by Cæsar may be seen in the account of Siege of Alesia in VIIth Book, where their counterparts, the cippi, lilia, and stimuli are fully described, and admirably illustrated in Von Kampen's maps. Coming to *inside* of the intrenchment it is obvious that if the enemy can get round the flanks he can fire on the defenders parallel with the inner side, or *enfilade* them. To obviate this,

embankments, or *traverses* are thrown up, perpendicular to the parapet, serving to keep off missiles, aimed from the flanks. The small space left between the escarp and exterior slope is called the *berm*, and is to enable the diggers to throw the earth on to it from the ditch instead of up the impossible height of the rampart, and to afford a walk by which the face may be repaired.

The dimensions of an intrenchment must of course depend on the time at disposal, the nature of the ground, and the number of men available, but there are certain rules dictated by common sense as well as geometrical conditions. Thus the *interior slope* of the parapet must be very steep to enable men to get close against it; of the two exterior slopes the upper or superior should be slight as possible to save it from presenting too prominent a mark to artillery fire; while the lower slope should of course be as steep as the consistency of the soil will allow; often it has to be kept in by *revetments* or bindings of fascines, hurdles, &c., or in permanent fortifications by masonry walls. The *command* of the crest of the parapet over the *glacis* should be such that an enemy standing on the edge of the glacis above the ditch cannot fire into the work; and the fire of the parapet ought to sweep the glacis at a height not greater than 2ft.

All this time I have been imagining the intrenchment to consist of a continuous straight line. The weak points of this are obvious. A straight line parapet can be defended only by its own direct fire, and further suppose the enemy—after great losses it may be—reforming in the ditch, how are they to be kept from escalading the parapet? Remember that guns cannot be depressed enough to fire into the ditch. The remedy is to provide *flanking defences* by constructing the intrenchment in a bent line, which will then present a series of *Salient* and *re-entering* angles; and enable the faces to be mutually swept by each other's fire.

FIELD FORTIFICATION.

Having given the general out-line of a fortification, I will say more in detail about the two ordinary divisions of the subject—field and permanent fortification. We must remember, however, that the same principles prevail in both.

As I have said, earth works are the earliest kind of defensive erection. A Roman army in the field entrenched itself every night as a precaution against surprise, and that not merely by a rude earthen embankment, but in a regular and scientifically planned encampment, formed by rule and measure. Indeed to have an eye to choose the best spot for a night's camp was one of the most desirable qualities of a Roman general.

History is repeating itself in this as in many other things. The use of the spade is being more clearly recognized by generals in the fields. The disaster of Isandlana brought home to us, as sharply as anything could, what

a fearful price may be paid for neglecting to intrench. Why our troops were not ordered to engirdle their position the night before that fatal conflict with something in the shape of an intrenchment, were it only a ring or laager of wagons, remains to this day a mystery. The omission cost us the loss of 1500 men, as well as much blood and treasure spent to remedy the defeat.

And not only as a mere defence against surprise, but as a material help to an attacking force, is intrenching work now recognized. In the old days of short-range fire-arms, the assaulting troops could assemble near enough to the object to be attacked to cover the intervening ground with one rush when the favourable moment came. But rifled arms have made this impossible. Troops are annihilated long before they can cross the wide space that separates them from the enemy's position. Some may remember Skobelev's storming a Turkish redoubt at Plevna, where though attacking in open formation, two, if not three, strong battalions were mown down before a sufficient number could pass the Glacis and ascend the parapet to drive out the Turk. For modern warfare then, some cover must be provided for men near enough to the objective point to enable them to traverse the intervening space quickly at the proper time. The simplest kind of cover is the *shelter trench*, which can be thrown up in less than half-an-hour, with the parapet high enough to protect a man lying down behind, and moreover can quickly be converted into regular intrenchments if it be found necessary to occupy the ground for any length of time. This simple shelter is also very difficult to capture by a front attack. Its great utility was brought out in the American Civil War and at Plevna.

In *American Civil War* the superiority of rifled small arms was fully realised, and the slightest protection from their deadly power became invaluable. Shelter trenches were used on most occasions. General Barnard said that a simple trench defended by two ranks of foot soldiers was impregnable against a direct attack. Gen. Wright states that, attacking a handful of infantry in single rank covered by a simple trench, with two divisions in line, he lost more than the enemy, and that if the intrenchment had been defended by two ranks of good troops a whole Army Corps could not have taken it.

In Aug., 1877, 10,000 Turks collected at PLEVNA and threw up shelter trenches, being at the time very deficient in artillery. General Krudener four days after attacked them with 7000 Russians and 20 guns, and was defeated with a loss of 2800 (nearly half). Ten days later he again attacked with 30,000 and 170 guns. Meanwhile the Turks had strengthened their lines and formed redoubts, their strength being swelled to 45,000. Again the Russians had to retire with loss of 8,000, (more than quarter). Six weeks later Krudener with 30 siege guns added to his previous artillery, after shelling the Turks for 4 days attacked with 50,000

Russians and Roumanians. The Turkish force also increased by 10,000, drove him back a third time leaving 15,000 dead and wounded (nearly one third), though the Roumanians won the large Gravitza redoubt. The Russians now convinced that Plevna was only to be taken by a regular siege set formally to work, but not till the *middle of December*, when they had assembled 110,000 men and 500 guns round the intrenched camp did they force Osman Pacha to surrender after a sanguinary sortie.

Napoleon strongly insisted upon the value of intrenchments to any army in the field. He acted on his own maxims and was imitated by his foes. Thus at Borodino the Russians hastily throwing up three redoubts and eight redans caused enormous loss to the French; and would not improbably have won the day, had the main redoubt been so closed at the gorge as to prevent the enemy from entering it by the rear. The lines of Torres Vedras are the most remarkable instance of extemporized defences. They were not continuous, but consisted of two strings of independent forts, redoubts, redans, &c., stretching from the Sea to the Tagus. The works enfiladed every approach and supported each other by a cross and flanking fire. The first line was about 29 miles long, the second about 24. 70,000 French had to retire baffled from them, though defended only by 50,000 allies, of whom half were raw and untried Portuguese.

Field works are in the main of two kinds, (1) open at the gorge, (2) closed. Of the former the *redan* is the simplest type, of the latter the *redoubt* or *fort*. The former should only be used when resting on rivers or on something that prevents their being taken in the rear. The *difference between a fort and redoubt* is that in the former every part of the works is flanked by some other part: in the latter no part or only a small portion receives flanking defence. Hence a redoubt will have no re-entering angles. It may be square, circular, or a polygon of any number of sides. Illustrations of a few of the different field works will be found in the plate (Fig. 6.)

PERMANENT FORTIFICATIONS.

We must now turn to the *permanent fortifications* of a Town; we shall see that they are constructed on almost the same principles as field works, allowance of course being made for more careful construction and more durable materials. As in tactics and manœuvres of armies in the field, so in this branch of warfare the vast changes that have occurred are due to gunpowder, artillery, and their improvements. Look at the fortifications of an ancient town or mediæval chateau. They consisted simply of thick walls, which were afterwards modified and strengthened by high towers to *flank* and command the approaches. We know that the walls of Babylon and Nineveh were impregnable. No battering engines that the military skill of those days could invent, no daring of the besiegers, could breach or scale those ramparts.

At the siege of Jerusalem it required all the battering machines of the Roman army to loosen four stones in the solid masonry of the Tower of Antonia. All fortifications were on this plan till the 16th century. Then guns playing from a distance in a few days brought the huge blocks of stone crumbling to the ground, and opened a broad road into the city. When the besiegers in overwhelming numbers poured through this breach and brought the matter to a hand-to-hand fight, in which superior numbers must prevail, it was seen that trust in the mere thickness and height of walls would no longer avail. Cities which had withstood long sieges were now reduced in a few days. Remedies had to be found. One was to repay the besieging artillery in its own coin. Guns were placed on the walls, and this necessitated changes in the form and construction of the towers. They were made lower with platforms for the guns, and—most important point—were pushed out further from the line of the walls so as to flank both the ditch and each other. To give full flanking power the old round or square tower was changed to the *Bastion*, an invention of the Italians in the 16th century. The earliest bastions now existing are at Verona and Antwerp. As soon as artillery was mounted on the walls, the old system of attack became obsolete. The huge movable towers of wood, universally employed by besiegers, could not be brought close up to the walls, and the battering rams were ruined while yet at a distance. Hence the defence gradually became equal to the power of attack; and at last surpassed it owing to the happy idea of *sinking the defences*. The form of a fortified place was entirely altered. Instead of tall exposed walls and towers rising high above the level of the ground, the appearance presented to one viewing it from the ground outside was a series of perhaps three green embankments, rising in succession, but even the most commanding of no great height. It was only when standing on the top of the sloping glacis that the spectator could realize the strength of the defences. He would then find himself looking down into a ditch many feet deep, on the other side of which was a high steep wall surmounted by the earthen parapet, and beyond that, if he penetrated he would find other ditches and other walls. Of course the object of sinking the defences was to keep the mass of them out of the line of artillery fire, and leave exposed only the earthworks which were most capable of resistance. From the time of this improvement the defence was superior to the attack, until in the 17th century the man arose who established military engineering on the basis which, with modifications of course, it has since occupied, until the introduction of rifled artillery in our own day.

Vauban was born in 1633, and served through the long reign of Louis XIV, whose ambition spread the flame of war throughout Europe, when consequently experience was not lacking. He created 33 new fortresses, and repaired and im-

proved 100; conducted 53 sieges, and was present at 140 battles and skirmishes. He was qualified then, if anyone was, to create a new system both of defence and attack. The latter—attack—I may touch on presently merely, saying that he made it so effective that even his own fortresses could not withstand it. The first of the three systems of Vauban I will attempt briefly to explain. (Figs. 1 and 2). The fortress may be of an octagon or decagon shape, or of any number of sides.

The body of the place, or in technical language the *enceinte*, consists of a series of bastions connected by *curtains* or straight pieces of rampart. This circuit is surrounded by a ditch, 15ft. to 30ft. deep, and 30yds. to 50yds. broad, being wet, dry, or a combination of both. The object of this great width is to keep the assailants as long as possible under fire. In front of the curtain is another work called the *tenaille*, lower than the rest of the works, so as not to stand in the way of their fire. Its purpose is to protect the postern gate, which is usually in the curtain; to cover troops which may be formed behind it for the defence of the ditch; and to fire into the next work when taken, viz. the *Ravelin* or *Demi-Lune*. This work is in front of the *Tenaille*; it has two faces meeting in a salient angle. Its objects are numerous, (1) it protects by a powerful flanking fire the salient angle of the bastions, while its own faces are similarly covered by the artillery fire from the faces of the bastions, (2) it covers the curtain, and (3) the faces and flanks of the bastions. Thus a powerful flanking fire can be directed along every face and on every angle. Each of these works has a wide ditch; and along the *counterscarp* of the outer ditch, about 6ft. below the top, runs a level walk, some 30ft. wide. This is the *covered way* and has several uses. (1) On it troops can securely assemble before making a sortie; and when repulsed they can retire to it, reform, and make an orderly retreat into the body of the fortress. The want of such a convenient cover was felt at the siege of Vienna by the Turks, when after an unsuccessful sortie the defenders were driven to the edge of the *glacis*, and simply hurled down the steep *counterscarp* into the ditch. (2) It gives a secure communication all round the fortress, where guards and sentinels are placed to prevent access to the ditch. (3) It is the chief musketry position and the most advanced work of the place. From it troops can direct a close grazing fire down the *glacis*. It is covered on the outer side by a parapet 5ft. to 9ft high, with a *banquette* for the musketry fire. On the enemy's side this parapet slopes away for 40 yards to 70 yards, forming the *glacis*. In the salient and re-entering angles, of this covered way are wider spaces, called *Places of arms* where troops can assemble for sorties or to repulse assaults and defend the branches of the way. To prevent the enemy, if once he has got into the covered way, from sweeping it right and left with

his fire, *traverses* or cross pieces are built across it, so that not more than 40 yards can be enfiladed at one time.

The Rampart is everywhere broad enough for the free working of the guns and passage of the defenders: and is divided into *terre plein*, *banquette*, *interior slope*, *parapet*, and *scarp*.

The guns are placed on the faces and flanks, either working in *embrasures*, i.e. gaps cut in the rampart, or raised above and firing over it, *en barbette*, as the method is called.

ATTACK OF FORTRESSES (Fig. 4).

As these have always been two of the chief functions of military science, it was always of the first importance to make each as effective as possible. Now efficiency in attack consists in shortness of time spent, certainty of result, and small loss of life. Notoriously there is nothing so wearing and harassing to a besieging army as to be kept lingering for months outside a fortress exposed to weather and fire in the obscure, though most necessary, duties of the trenches. Unfortunately the sieges of the British arms have rarely come up to this ideal. Of a long and wearying siege the instance that readily occurs is *Sebastopol*. N.B.—Long defence of Sebastopol due to fact that North side was left open, as it was impossible to invest it. Hence South side became a detached line of powerful intrenchments, defended by a whole army. Of sieges that, if short, were bloody and destructive of life, Wellington's attacks on Badajoz and Ciudad Rodrigo are examples very much in point. At Badajoz as many men were sacrificed as would have sufficed for ten regular sieges. But we must remember that Wellington had no choice in the matter; he was driven either to a prodigal sacrifice of life, or to the abandonment of his schemes for the deliverance of Spain. If we hear him blamed for unscientific conduct of the sieges, in neglecting approach by trench and sap, we must call to mind that the government at home did not supply him with a single sapper or miner, i.e., with a single workman scientifically trained to make the due approaches, until the year 1813.

I have already shown how the invention of gunpowder made the capture of mediæval fortresses an easy matter; how the defence had to resort to changes in construction in order to make itself equal to the attack; how this object was achieved by the flanking bastions and by sinking the defending walls; and how by these means the capture of a fortress on the new plan became an unsolved problem till Vauban developed his system of attack; and made it so scientific and irresistible that fortresses even of his own construction had to succumb beneath it.

The difference became most marked between the wearing tediousness of ancient and mediæval sieges, and the scientific certainty and comparative bloodlessness of Vauban's method. This was due to two inventions, *ricochet*-

fire, by which the besiegers' guns were dismounted, and advancing by *parallels* and *saps*. By these, together with the scientific placing of enfilading and other batteries, he made it possible to advance to the very foot of the fortress with inconsiderable loss. The real type of this attack is a *moving parapet*, the besieger using the best means of defence in order to make his offensive movement irresistible. He, as it were, is perpetually pushing a parapet in front of him, keeping himself out of sight, while with insidious steadiness he is creeping to the top of the glacis; and not stopped by the ditch pushes his sap or mine over it to the foot of the rampart, which he then breaches or undermines. The utmost resistance the besieged can oppose to this mole-like working is as a rule futile, from the very fact that the enemy is working invisibly.

Ricochet fire is the art of projecting a shot with a charge and elevation so calculated that it shall strike the ground *short* of the mark, then rebound and skim along a little way above the surface; doing this several times and of course knocking over every thing it encounters. The shot just clears the parapet, and bounding along the rampart, dismounts the guns in succession. Hence Ricochet batteries are placed so as to enfilade the faces of works, *i.e.*, not to hit the face perpendicularly, but so that the shot may move parallel with the face on the inside, thus encountering the guns in succession. They were first used by Vauban at the siege of Ath in 1697.

We will suppose that the *investment* is completed, that the town is hemmed in, and obliged to defend itself without hope of external help, at any rate for some time. The besiegers have raised *lines of circumvallation* fronting outwards, to resist a relieving attack in the rear, and *lines of contravallation* with faces toward the place, to repel sorties.

Approaches are now made, the process being called "*breaking ground*" or *opening the trenches*.

Before the days of rifled cannon, *ricochet* batteries were established not further than 600 yards, and if possible within 400 yards.

To facilitate the construction of batteries, a covering force is posted as near as possible, to protect which a trench is cut parallel to the fortifications, embracing all the front to be attacked, at about 600 yards, the earth being thrown to the front for a parapet. This is *1st Parallel*.

Zigzag trenches in the rear form communication with the camp behind. The trench is then enlarged by fresh men to 10ft. wide, 3ft. deep, and with a slope to the rear for drainage; and along this covered road guns, waggons, and men can move securely.

Having got his cover the besieger may now post his *batteries*. It is best to post them 50 or 60 yards in front of the parallel, as being nearer to

point of attack, yet not so far as to be beyond protection; of course they are connected with the parallel by trenches.

As soon as the batteries open fire, trenches of approach from the first parallel may be commenced, in zigzags alternately to right and left, so that their prolongations fall clear of the fortress on either side; care being taken to trace them so as to be protected from danger of onflade.

When the approaches have got half way to the fortress, i.e. 300 yards, a *2nd Parallel* becomes necessary, as otherwise the working parties would be nearer to the enemy than to their own supports. The *2nd Parallel* being within 300 yards of the fortress, cannot be made till the garrison's artillery shall have been in part at any rate silenced. It is then executed by *Flying Sap*, a method which takes a much shorter time, and therefore is of great use when cover is urgently needed; i.e. each man places two gabions or large hollow baskets in front of him to form a foundation of the parapet, and excavates a narrower trench behind; throwing the earth beyond the gabions for the parapet. The approaches being carried on by flying sap 70 or 80 yards in front of *2nd parallel*, till within range of musketry from the covered way, the besiegers resort to *the Sap*, a process by which entrenchments can be carried on under musketry fire. Roughly speaking this is made by the workmen pushing on a large gabion in front of them as a protection from fire, and then placing a row of gabions on the outer edge of the trench, beyond which they throw the excavated earth, as in the flying sap. The rate of progress is on an average about 10ft. per hour.

Double Sap is used when the approaches can no longer be made by zigzag, the rate being too slow, i.e. when 100 yards of zigzag do not carry the works 32 yards in advance. It consists of two single saps carried on side by side straight towards the place, forming parapets on both sides. When the approaches are about 150 yards from the place, short *demi Parallels* are made from angles of zigzags to cover firing parties of infantry there placed, and to oppose musketry of garrison from covered way; mortar batteries are also placed there.

When approaches have arrived at the foot of the glacis from salients of covered way, the *3rd Parallel* is formed. This is necessary to give the besieger a sure position where he may gather men and materials to attack the covered way.

The next thing is to form a *lodgment on the crest of the glacis* or crown *the covered way*, which may be done by assault, but only if the defenders are weak and dispirited, then generally at a heavy cost, or by *systematic approach*. The approach is too difficult to be understood without a plan. It involves work under fire by double sap, and the erection of cover for infantry called *trench cavaliers*. When successful it ends in a lodgment being effected

on the crest of the glacis; the besiegers then erect *breaching batteries* to fire straight upon the works with only the breadth of the ditch between.

Lodgment on glacis consists of a trench parallel to and 6 yards from the crest.

The besieged are allowed no rest day or night. At the first opening of the siege they were exposed to the fire of some 50 guns in the first parallel, then to the missiles of howitzers and artillery in the second, mortars in the third, and now to the breaching batteries close in front of the defences. They are driven from the covered way, and the enemy begins the *descent of the ditch*, either by driving a gallery downwards to the level of the ditch and then carrying a sap across the ditch to the foot of the breach, or by *blowing in the counterscarp*, which is done by driving a gallery to behind revetment of the counterscarp and then exploding it, thus filling up ditch.

The ditch is crossed by trench made by sap, extending to foot of the breach (the breaching batteries having of course been hard at work up on the crest), and the flank defences are subdued by other batteries above, by vertical fire from mortars, and by musketry.

The breach being declared practicable the supreme moment arrives for making the assault. This is done with as many precautions as possible against loss of life, according to Vauban's maxims, care being taken to direct a terrible fire of all arms on the summit of the breach to clear it as far as practicable of defenders. The least bloodless assault is begun by a few sappers running up the breach and taking cover, and working to form a lodgment, then retiring when the defenders approach; the latter are driven back by musketry, &c., from breaching batteries and glacis; then more sappers come up and continue lodgment, which is then occupied by detachments. Then the work is extended right and left along the rampart.

Or if it be impossible to do this, the assault is made at once in force, all care having been previously taken to make communication from trenches to breach easy. With this systematic approach contrast *assault on Redan* (Sebastopol), when our trenches were not nearer than 250 yds.; hence the men were breathless when they reached the ditch.

CHANGE PRODUCED BY RIFLED LONG RANGE GUNS.

Long range rifled guns have altered the mode of attack. The enemy can raise his batteries far off commanding two or three points of the circumference, taking advantage of woods, walls, or other natural obstacles to mask them; and when all is ready he unmasks his batteries, and covers a segment of the defence with an overwhelming number of shells. From the great distance and elevation of these guns, the projectiles plunge into all parts of the defences and do not merely strike the faces point blank. This same distance makes it most difficult for the defenders to distinguish the position of he

batteries: they have only the smoke to guide them, and all the time that they are struggling to keep their guns working amid the iron hail, the enemy's men, except the artillerymen, are comparatively sheltered, as he has an indefinite amount of space in which to keep them out of fire. Two or three days of this attack reduce the defences to a heap of ruins; it becomes impossible to keep the guns in working position among the heaps of debris, and next to impossible for any defenders to live at the side of the artillery still left standing. And we must remember that the modern percussion shell which explodes on striking, is more certain to explode, and has more destructive effect than the old shell with a time fuze.

Therefore in proportion to the length of the trajectory the defences must be posted outwards from the body of the place. All modern fortresses of large size are thus constructed with outlying forts, of course at an enormous increase of expenditure.

These fortresses have the further advantage of requiring very large armies to invest them, *e.g.* Metz and Paris.

In the Franco-German war the advantage of long range arms was apparent on both sides. As regards the defence, Belfort was almost the only French fortress with long range guns. With the help of these it covered a circle of 12 to 16 miles in diameter, protected sorties over a radius of 3 to 4 miles; for a month hindered the planting of siege batteries, and in spite of a bombardment of 73 days, had only 4 of its houses burned. The batteries of the besieged hardly suffered at all, and had recourse to *indirect firing*, *i.e.*, they fired from the gorge of the castle over the barracks without seeing the object aimed at, to the great bewilderment and inconvenience of the Germans, who did not know how to regulate their reply to this invisible fire.

Hence it becomes a question whether the long range weapons are not as much advantage to the defence as to the attack.

The destructive power of explosives from modern guns hinders siege works of approach: consequently the Germans never employed the old mode of attack by trench and assault on the breach. *This famous old system may therefore now be pronounced obsolete.* If not quite obsolete, yet *Ricochet* fire has lost its value: *parallels* have to be begun at a much greater distance. (2000 yds. at Sebastopol). Siege batteries have to open at a much earlier stage and at distances hitherto undreamt of and the details of the making of saps and batteries are completely altered. The Germans took up their position at some 4000 yds. from the French fortresses, which were adapted to ranges of a little more than 2000 yds.; and covered the works with shells without risk to a single sapper.

How then can the defence, with the aid of rifled guns, be made equal or superior to this system of attack? The answer is that the defenders must

place their forts to suit the new conditions, and have several encircling a place instead of relying on one alone.

The new isolated forts must afford *space for a large number of fires, even indirect fires in case of need*, consequently they require extended faces and short flanks. They must consider defence at close quarters of only *secondary importance*, as it is not likely to be required. Thus the old projecting faces and flanks of the bastions are done away with, and fortification has arrived at the *Polygonal Trace*, which is calculated to be 100 per cent. better than the Bastion Trace. At its best the *Bastion trace had serious defects*.

- (1) The flanks subtracted so much space that might have been used for direct fire from the faces.
- (2) The flank is enfiladed by direct fire on the face, and taken in reverse by enfilade of that face and direct fire on opposite face and flank.

And as regards the altered conditions of modern warfare the flanks can now be destroyed by distant fire, and thus they lose their value as protectors of the curtain ditch.

Thus the attack and defence must, it seems, for the future depend upon the scientific development of artillery fire, and on the construction of fortresses that give the greatest facilities for throwing the projectiles. The *Bombardment of Alexandria* seems also to have established that forts must, to a large extent, abandon masonry defences. The loss from splinters in the Alexandria forts was as great, if not greater, than that from the projectiles themselves. Hence, though masonry may be used inside, yet the external and internal surfaces must be faced with earth to a great depth.

Any who may wish to learn more about fortifications by means of diagrams and models will find plenty of the former in Lendy's Fortification, and the article on Fortification in the *Encyclopædia Britannica*. The illustrations in the former book or Chambers' *Encyclopædia* will make the 'Attack' intelligible; by mere description it never can become so. Also the first page of the *Atlas* to Alison's *History* will be found useful. These books are in the Adderley Library. For models, let any who have an opportunity go to the Rotunda at Woolwich, near the Barracks. There they will see several splendid models, notably one of Gibraltar, a fine collection of arms, and a model of Fort William at Calcutta, which will fairly illustrate the description of Vauban's fortress, though the details are somewhat different. But above all, if they can get a ticket from an officer who is a member of the United Service Institution in Whitehall Yard, let them study the admirable model of a siege in its last stage there to be found. It shows the trenches, saps, and breaching batteries, and all the details of defence most clearly. In the same Museum is a very large model of Waterloo with the combatants engaged, and another of Sebastopol and the neighbourhood.

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FIG. 1

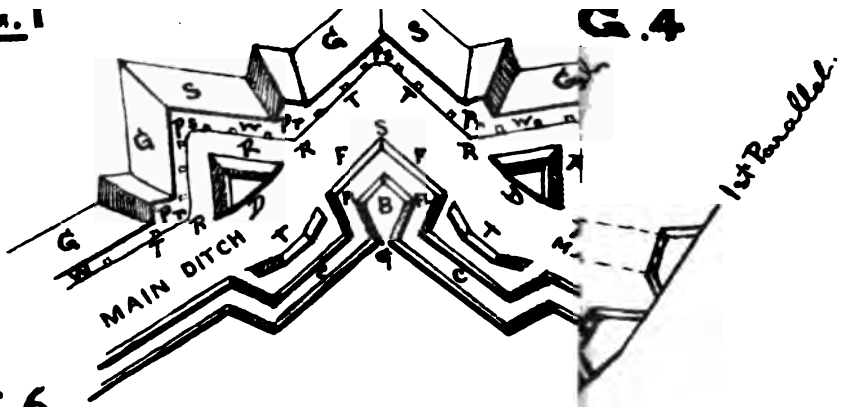


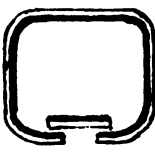
FIG. 6



REDAN.



LUNETTE.

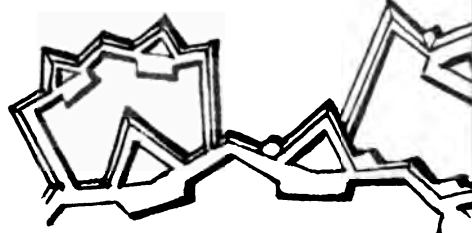


REDOUST.
with chancro.



STAR FOR

FIG. 5



CROWN-WORK. — HORN W

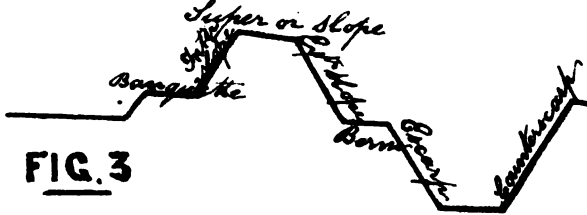


FIG. 3



CINE.

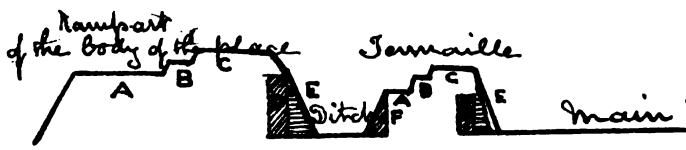


FIG. 2

SECTION

A terre plein, B bar

Those interested in Naval fights will find the Battle of Trafalgar represented in a model of large scale ; and everyone will have plenty to look at in the curious specimens of armour, weapons, and military relics of all kinds.

KEY TO FIG. 1.

Fortress on Vauban's 1st system.

- | | |
|--------------------------|--------------------------------|
| C. Curtain. | W. Covered Way. |
| B. Bastion. | tt. Traverses on covered way. |
| ff. Bastion faces. | Ps. Salient place of arms. |
| fl. Bastion flanks. | Pr. Re-entering place of arms. |
| g. Gorge of Bastion. | GG. Glacis. |
| ss. Salient angles. | |
| rr. Re-entering angles. | |
| T. Tenaille. | |
| R. Ravelin or Demi-lune. | |

KEY TO FIG. 4.

- a. Gun and Howitzer Batteries.
- b. Heavy Mortar Batteries.
- c. Small ditto.

ENTOMOLOGICAL SECTION.

THE year 1882 will be memorable for its persistent unkindness to Entomologists. Our work has been much hampered by unpropitious weather, and when collecting is at a discount, interest naturally flags. Sugaring was out of the question all the summer term. Still, although a few good insects have been taken, the lists of notices are poor. In the Lepidoptera there is a marked falling off compared with previous years. It is a pity too that the real work done has been accomplished by so few hands. Under favourable circumstances, such as the Field Days of the Society, there are always many equipped for work, but from whatever cause there is a want of the true scientific spirit, which succeeds where mere interest fails to profit. It is to be hoped this is due to temporary causes only. We look confidently forward to seeing younger members take the places of Maddock, whose loss we so much regret, and Blandford, who has always been ready to impart to others what he has discovered for himself. The Stanton prize was won by Benson, who beat Dobie by his steady perseverance, but the standard reached was below that of previous years. There is a wide choice of subject open for the coming season, and we must hope that the competition will be good. It must never be forgotten that it is not the prize winner who is the only one to profit, if the offer of prizes is of any use. A prize was also given for drawings of insects exhibiting protective colouring. Rotheram's productions showed observation and care, and he deserved to win. Besides the above there are in the school many willing amateurs. They will never repent, if they endeavour to become something more, and there will shortly be a new stimulus given by the opening of our new Museum. Our collections both of Lepidoptera and Coleoptera are already rearranged and made it is hoped more valuable, only waiting to be transferred to their new home. To this our thanks will be due to Mr. Preston, who has most kindly superintended their renovation under the careful hands of Mr. Mosely of Huddersfield, who was at work upon them during a portion of the Michaelmas term. The meetings of the section were continued at intervals during the spring and summer. There has been no lack of members, but attendances have been scanty. It is proposed to attempt to put them on a different footing, for it is of little value for such gatherings to degenerate into lectures. If there are enough who care to contribute to their interest, there will then be an object in maintaining them, but without life they are merely scientific parades. Let us look forward to a more propitious season.

Initials of Collectors :

A.A.	...	...	A. Adams.
V.A.B.	...	...	V. A. Bankes.
E.F.B.	...	...	E. F. Benson.
R.J.M.B.	...	...	R. J. M. Berkeley.
W.F.B.	...	...	W. F. Blandford.
G.K.B.	...	...	G. K. Blasson.
E.K.C.	...	...	E. K. Chambers.
W.H.C.	...	...	W. H. Coates.
C. ...	...	...	Mr. Coleman.
B.H.R.D.	...	...	B. H. R. Daltry.
H.F.D.B.	...	...	H. F. Darell-Brown.
M.L.L.D.	...	...	M. L.L. Davies.
H.D.	...	...	H. Dobie.
E.E.D.S.	...	...	E. E. DeSatgé.
R.F.G.	...	...	R. F. Giveen.
L.C.H.	...	...	L. C. Hamerton.
C.R.L.	...	...	C. R. Lias.
P.H.M.	...	...	P. H. Maddock.
G.T.K.M.	...	...	G. T. K. Maurice.
T.A.P.	...	...	Rev. T. A. Preston.
W.B.P.	...	...	W. B. Price.
S.H.R.	...	...	S. H. Reynolds.
W.H.R.	...	...	W. H. Rotheram.
E.A.S.	...	...	E. A. S. Stanton.
A.F.E.S.	...	...	A. F. E. Stiffe.
E.J.T.	...	...	E. J. Teesdale.
W.L.W.	...	...	W. L. Wainwright.
J.J.W.	...	...	J. J. Wright.
h	...	...	hybernated.

R H O P A L O C E R A.

Gonepteryx Rhamni—Male, Feb. 26,
W.B.P.; female, Mch. 8,
P.H.M.
Pieris Brassicae—May 7, W.F.B.
Rapee—May 20, T.A.P.
Napi—May 20, T.A.P.
Anthocharis Cardamines — May 4,
T.A.P.
Arge Galathea—July 1, H.F.D.B.

Lasiommata Aegeria—May 13, W.L.W.

Megara—May 13, E.A.S.
Hipparchia Janira—June 7, E.F.B.
Tithonus—Aug.—, C.
Typeranthus—July 2, W.F.B.
Cosmonympha Pamphilus—May 7,
H.D.
Cynthia Cardui—June 7, W.F.B.
Vanessa Io (h) Mch 7, S.H.R.
Polychlorea (h) Mch. 17, H.D

- Urticæ (h) Feb. 5, M.L.D.;
 June 27, H.D.
 Argynnis Paphia—July 15, W.H.B.
 Adippe—June 27, W.H.B.
 Aglaia—June 23, L.C.H.
 Selene—May 7, P.H.M.
 Euphrosyne—May 7, P.H.M.
 Melitæa Artemis—May 31, E.F.B.
 Nemeobius Lucina—May 18, H.D.
 Thecla W-album—Aug. 10, P.H.M.
 Quercus—Aug.—, C.
 Rubi—May 7, P.H.M.
 Chrysophanus Phlæas — May 13,
 E.A.S.
 Lycæna Alsus—July 1, H.F.D.B.
 Alexis—May 22, E.F.B.
 Agestis—Aug. — C.
 Thymele Alveolus—May 7, W.F.B.
 Thanaos Tages—May 7, E.A.S. &
 W.F.B.
 Pamphila Linea—July 9, E.F.B.
 Sylvanus—May 29, H.D.
 H E T E R O C E R A .
 SPHINGINA.
 Procris Geryon—May 29, A.A.
 Statice—June 7, W.F.B.
 Zygaena Lonicera—June 25, E.N.G.
 Filipendulæ—June 23, P.H.M.
 Smerinthus Ocellatus — July 6,
 W.H.C.
 Populi—July 5, P.H.M.
 Tilis—June 19, W.H.R.
 Sphinx Ligustri—June 3, P.H.M.
 Chærocampa Elpenor — June 18,
 P.H.M.
 Macroglossa Stellatarum—May 6,
 C.R.L.
 BOMBYCINA.
 Hepialus Lupulinus—May 18, H.D.
 Humuli—June 7, E.F.B.
 Velleda—May 27, W.F.B.
 Lophopteryx Camelina — May 16,
 H.D.
 Demas Coryli—May 4, G.T.K.M.
 Gnophria Rubricollis—May 28, P.H.M.
 Arctia Caja—July 19, H.D.
 Nemeophila Plantaginis—June 17,
 W.F.B.
 Phragmotobia Fuliginosa—May 13,
 W.L.W.
 Spilosoma Menthastri — May 17,
 R.J.M.B.
 Luhricepeda—May 19, T.A.P.
 Callimorpha Jacobææ — May 16,
 V.A.B.
 Eriogaster Lanestris—(bred) Mch. 1,
 P.H.M.
 Odonestis Potatoria—July 4, J.J.W.
 Cilix Spinula—July 9, E.F.B.
 Drepana Falcataria—May 16, H.D.
 Unguicula—May 1, E.F.B.
 Cymatophora Duplaris — June 21,
 E.F.B.
 Flavicornis—Mch. 14, W.F.B.
 Ridens (bred)—Mch. 10, P.H.M.
 Bryophila Perla—July 7, P.H.M.
 Acronycta Psi—May 9, E.F.B.
 Rumicis (bred)—June 27, P.H.M.
 Leucania Impura—Aug. 10, P.H.M.
 Hydræcia Micacea—Oct 3, T.A.P.
 Xylophasia Polyodon — July 6,
 P.H.M.
 Mamestra Brassicæ — May 18,
 E.E.D.S.
 Persicariæ—May 18, E.F.B.
 Apamea Basilinea—June 17, W.F.B.
 Unanimitis—June 6, P.H.M.
 Oculea—June 8, P.H.M.
 Miana Strigilis—June 26, E.F.B.
 Grammesia Trilinea—June 24, E.F.B.
 Caradrina Cubicularis— June 20,
 H.D.

- Busina Tenebrosa*—June 7, H.D.
Agrotis Exclamationis—June 12, E.F.B.
Triphaena Pronuba—June 29, E.F.B.
Noctua Augur—June 18, E.F.B.
C-nigrum—Oct. 10, E.F.B.
Festiva—July 6, W.F.B.
Tæniocampa Gothica—Mch. 11, P.H.M.
Stabiis—Mch. 11, P.H.M.
Anchocelis Pistacina—Oct. 4, H.D.
Cerastis Vaccinii—Mch. 15, P.H.M.
Phlogophora Meticulosa—June 8, A.F.E.S.
Hadena Dentina—June 11, W.F.B.
Pisi—(bred) Mch. 29, P.H.M.
Adusta—June 13, H.D.
Genistæ—June 21, H.D.
Xylocampa Lithorhiza—Mch. 7, W.F.B.
Brephos Parthenias—Mch. 14, P.H.M.
Plusia Chrysis—June 28, W.F.B.
Gamma—May 13, E.J.T.
Gonoptera Libatrix—Nov. 19, W.F.B.
Naenia Typica—June 26, W.F.B.
Euclidia Mi—May 18, E.F.B.
Glyphica—May 30, E.F.B.
Phytometra Ænea—May 18, H.D.
 GEOMETRINA.
Ourapteryx Sambucaria—July 15, W.B.P.
Rumia Cratægata—May 14, E.F.B.; G.K.B.
Angerona Prunaria—June 17, W.F.B.
Metrocampa Margaritata—July 3, H.D.
Eurymene Dolobraria—May 27, W.F.B.
Ennomos Tiliaria—Oct. 6, W.F.B.
Fuscantaria—Oct. 2, W.H.R.
Angularia—Sep. 23, E.K.C.
Himera Pennaria—Nov. 12, E.K.C.
Phigalia Pilosaria—Feb. 1, R.F.G.
Amphidasis Prodomaria—Mch. 10, W.F.B.
Betularia—June 8, P.H.M.
Hemerophila Abruptaria—Mch. 18, T.A.P.
Boarmia Rhomboidaria—July 12, W.F.B.
Tephrosia Crepuscularia—May 2, W.F.B.
Laricaria—Mch. 11, W.F.B.
Iodis Lactearia—May 9, H.D.
Ephyra Trilinearia (bred)—May 9, P.H.M.
Asthena Luteata—June 11, W.F.B.
Candidata—May 7, H.D.
Sylvata—June 17, W.F.B.
Acidalia Trigeminata—July 1, H.F.D.B.
Virgularia—June 3, E.F.B.
Remutata—May 20, E.F.B.
Aversata—June 20, H.D.
Cabera Pusaria—May 7, E.F.B.
Corycia Punctata—May 18, H.D.
Taminata—May 28, P.H.M.
Strenia Clathrata—May 12, H.M.G.
Panagra Petraria—May 11, H.M.G.
Fidonia Atomaria—June 17, W.F.B.
Minoa Euphorbiata—June 6, P.H.M.
Ligdia Adustata—May 16, H.D.
Lomasipilis Marginata—May 27, E.F.B.
Hybernia Rupicaprararia—Jan. 20, W.F.B.
Lencophearia—Feb. 21, W.B.P.
Progenmaria—Feb. 4, W.F.B.
Defoliaria—Nov. 5, B.H.R.D.
Anisopteryx Æscularia—Mch. 10, W.F.B. (male); Mch. 14, A.F.E.S. (female),
Cheimatobia Brumata—Nov. 25,

W.F.B.

Oporabia Dilutata—Nov. 5, B.H.R.D.*Larentia Didymata*—July 9, E.F.B.*Miaria*—May 17, H.D.*Emmelesia Affinitata*—May 13,

W.F.B.

Alchemillata—July 22, P.H.M.*Eupithecia Consignata* (bred)—Apl.

27, P.H.M.

Subfulvata—July 8, W.F.B.*Lariciata*—May 21, H.D.*Vulgata*—May 7, W.F.B.*Thera Variata*—May 18, E.F.B.*Macaria Liturata*—May 27, P.H.M.*Ypsipetes Elutata*—July 9, E.F.B.*Melanippe Unangulata*—June 2,

W.F.B.

Rivata—June 1, H.D.*Biriviata*—May 11, W.F.B.*Montanata*—May 8, W.F.B.*Fluctuata*—May 7, P.H.M.*Anticlea Derivata*—May 2, W.H.R.*Coremia Propugnata*—May 5, W.B.P.*Ferrugaria*—May 6, W.F.B.*Unidentaria*—May 13, E.F.B.;

H.F.D.B.

Camptogramma Bilineata—June 7,

E.F.B.

Scotosia Dubitata—Sep. 16, W.F.B.*Vetulata*—July 22, P.H.M.*Cidaria Miata*—Apl. 29, P.H.M.*Corylata*—May 30, H.D.*Russata*—June 4, W.F.B.*Immanata*—July 9, E.F.B.*Silaceata*—May 18, E.F.B.*Pyrliata*—July 13, W.F.B.*Dotata*—July 12, W.F.B.*Eubolia Mensuraria*—July 22, P.H.M.*Anaitis Plagiaria*—June 7, W.F.B.*Odezia Chærophyllata*—June 5,

W.B.P.

PYRALIDINA.

Hypena Proboscidalis—June 26,
P.H.M.*Herminia Barbalis*—May 27, E.A.D.S.*Nemoralis*—May 30, H.D.*Pyrausta Punicealis*—May 25, H.D.*Purpuralis*—May 12, W.F.B.*Herbula Cespitalis*—May 18, H.D.*Hydrocampa Nymphæata*—May 29,
H.D.*Botys Pandalis*—May 15, H.D.*Verticalis*—May 30, H.D.*Urticata*—May 28, P.H.M.*Scopula Olivalis*—June 23, H.D.*Prunalis*—May 29, E.F.B.*Stenopteryx Hybridalis*—Aug. 10,
P.H.M.*Nola Cristulalis*—May 10, P.H.M.*Simaethis Fabriciana*—May 21,
E.F.B.*Eudorea Ambigualis*—May 12,
W.F.B.*Crambus Pratellus*—May 27, E.F.B.*Hortuellus*—July 4, E.F.B.*Tristellus*—Aug. 10, P.H.M.*Chloephora Prasinana*—May 13, H.D.

TOBTRICINA.

Eulia Ministrana—May 16, H.D.*Antithesia Cynosbatella*—June 17,
H.D.*Pruniana*—June 15, H.D.*Tortrix Viridana*—July 1, W.H.R.*Forsterana*—July 4, E.F.B.*Lozotaenia Sorbiana*—July 4, E.F.B.*Musculana*—May 17, H.D.*Xylosteana*—July 5, P.H.M.*Ptycholoma Lecheana*—June 12,
H.D.*Pardia Tripunctana*—May 13, E.F.B.*Lithographia Campoliliana*—May 13,
E.F.B.

- Halonota Brunnichiana—June 17,
 H.D.
 Coccyx Hyrciniana—May 6, W.F.B.
 Anchylopera Mitterbacheriana —
 June 11, H.D.
 Lundana—May 14, P.H.M.
 Argyrotoza Conwayana -- May 16,
 H.D.
 Cressia Bergmanniana—June 10,
 E.F.B.
 Roxana Arcuella—June 1, H.D.
 Eucelis Aurana—June 21, H.D.
 Ehippiphora Argyrana—May 2,
 W.F.B.
 Regiana—June 8, W.F.B.
 Stigmonota Perlepidana — May 4,
 E.F.B.
 Grapholita Ulicetana—May 10, P.H.M.
 Cnephasia Subjectana — May 29,
 E.F.B.
 Sericoris Lacunana—May 30, H.D.
 Urticana—May 26, H.D.
 Chrosia Tesserana—June 20, E.F.B.
 Argyrolepis Cnicana—June 17, H.D.
 Xanthoetia Hamana — July 1,
 W.H.B.
 Tortricodes Hyemana—Mch. 11,
 W.F.B., and P.H.M.
 TINEINA
 Chimabacche Fagella — Mch. 11,
 W.F.B.
 Nemophora Swammerdammella—
 May 13, H.D.
- Schwarziella—May 6, W.F.B.
 Adela De Geerella—June 18, P.H.M.
 Viridella—May 11, H.D.
 Micropteryx Thunbergella—May 11,
 H.D.
 Allionella—May 18, H.D.
 Subpurpurella—May 6, W.F.B.
 Swammerdamia Pyrella—May 6,
 W.F.B.
 Hyponomeutus Padellus — (bred)
 July 23, E.F.B.
 Harpella Geoffrella—June 30, E.F.B.
 Dasycera Sulphurella—May 13, H.D.
 Cecophora Pseudospretella—Feb. 9,
 W.F.B.
 Endrosis Fenestrella—Feb. 2, W.F.B.
 Glyphipteryx Fuscoviridella — June
 21, E.F.B.
 Thrasonella—June 9, E.F.B.
 Gracilaria Swederella—June 23, H.D.
 Syringella—May 9, H.F.D.B.
 Elachista Gleichenella—May 29, H.D.
 Cygnipennella—May 21, E.F.B.
 Lithocolletis Cramerella — May 9,
 W.F.B.
 Quercifoliella—May 9, H.D.
 Cemiostoma Laburnella — May 9,
 E.F.B. & H.F.D.B.
 PTEROPHORINA
 Pterophorus Phæodactylus—July 22,
 P.H.M.
 Fuscus—July 1, H.D.
 Pentadactylus—Aug. 10, P.H.M.

COLEOPTERA.

THE notices for the year amount to 258, an increase again on the last record, but by no means as large as it might be. Blandford has done some good work, and it is hoped that now our collection is arranged and set out, others will be inspired to follow his example and substitute work of some value to themselves in place of merely transient interest.

The italics mark species not recorded last year.

The following list will explain initials :—

G.W.A.	G. W. Atlay.
V.A.B.	V. A. Bankes.
E.F.B.	E. F. Benson.
G.H.C.B.... ..	G. H. C. Berkeley.
W.F.B.	W. F. Blandford.
H.C.B.	H. C. Bucknall.
E.K.C.	E. K. Chambers.
P.M.K.C.... ..	P. M. K. Chambers.
C.E.C.	C. E. Cooper.
H.J.C.	H. J. Cooper.
H.F.D.B.... ..	H. F. Darell-Brown.
E.E.de S.... ..	E. E. de Satgé.
F.E.D.H.... ..	F. E. Drummond Hay.
W.J.F.	W. J. Ford, Esq.
L.C.H.	L. C. Hamerton.
T.N.H.S.	Rev. T. N. Hart-Smith.
J.A.H.	J. A. Hay.
R.L.	R. Langworthy.
G.T.K.M.... ..	G. T. K. Maurice.
W.B.M.	W. B. Maurice.
T.A.P.	Rev. T. A. Preston.
W.B.P.	W. B. Price.
R.W.R.	R. W. Rickards.
H.H.R.	H. H. Robins.
W.H.R.	W. H. Rotheram.
E.A.S.	E. A. Stanton.
H.V.T.	H. V. Thomson.
R.A.W.	R. A. Waddilove.
J.A.W.	J. A. Wanklyn.
W.L.W.	W. L. Wainwright.

- Cicindela campestris*—C.E.C., Ap.30
Notiophilus biguttatus—G.T.K.M.
 and W.B.M., Feb. 26.
Elaphrus cupreus—W.F.B., May 11.
Carabus granulatus—G.T.K.M. and
 W.B.M., Feb. 7.
catenulatus—R.A.W., Mar 19.
violaceus—
Nebria brevicollis—G.T.K.M., Feb. 7.
Leistus ferrugineus—May 16, W.F.B.
Demetrias atricapillus—T.N.H.S.,
 May 13.
Dromius quadrimaculatus—E.E.deS.
 Mar. 10.
Loricera pilicornis—G.T.K.M., Feb. 7.
Chlaenius nigricornis—P.M.K.C., Ap.1
Calathus melanocephalus—G.T.K.M.
 and W.B.M., Feb. 26.
Anchomenus dorsalis—G.T.K.M. and
 W.B.M., Feb. 10.
parumpunctatus—G.T.K.M. and
 W.B.M., Feb. 10.
albipes—G.T.K.M., Feb. 26.
moestus—W.B.M., Feb. 26.
Pterostichus vulgaris—E.E. de S.,
 Mar. 18.
stenuus—G.T.K.M., Feb. 26.
oblongo-punctatus—W.F.B.,
 May 6.
Amara plebeia—W.F.B., July ?
acuminata—G.T.K.M., Mar. 10.
trivialis—E.E.de S., May 7.
Harpalus rubripes—W.F.B., May 13.
ruficornis—W.B.P., Mar. 14.
Bradycellus verbasci—R.A.W., May 15.
Patrobus excavatus—W.F.B., June 20
Bembidium obtusum—W.B.M., Feb.
 26.
quadrimaculatum—W.H.R.,
 Mar. 10.
quadriguttatum—H.V.T., Mar.10
lampros—G.T.K.M., Feb. 26.
littorale—W.B.M., Feb. 10.
guttula—T.A.P., Mar. 16.
biguttatum—E.E.de S., Mar. 18.
Halipus obliquus—W.F.B., May 25.
ruficollis—R.A.W., Mar. 19.
Hydroporus palustris—W.F.B., May
 26.
Agabus bipustulatus—T.N.H.S.,
 Mar. 4.
uliginosus—R.A.W., Feb. 6.
maculatus—R.A.W., May 12.
Hyphydrus oratus—W.F.B., May 22.
Pelobius Hermannii—W.F.B., May 6.
Dytiscus marginatus—T.A.P., Ap. 5.
Acilius sulcatus—W.F.B., May 6.
Gyrinus natator—W.F.B., May 6.
Helochaeres lividus—W.F.B., May 6.
Helophorus aquaticus—W.F.B., May
 6.
granularis—R.A.W., Mar. 19.
nubilus—W.F.B., July ?
Sphaeridium scarabaeoides—R.L. and
 J.A.W., Feb. 20.
marginatum—W.F.B., May 26.
Cercyon lateralis—W.F.B., May 6.
melanocephalus—W.F.B., May 6.
hoemorrhoidalis—W.F.B., May 6.
Aleochara fuscipes—W.F.B., May 16.
Homalota brunnea—W.F.B., July ?
Tachyporus obtusus—E.E.de S., Mar.
 12.
chrysolinus—G.T.K.M., Mar.
 4.
brunneus—W.F.B., July.
hucerosus—T.N.H.S., May 13.
Tachinus rufipes—E.K.C., Mar. 19.
Quedius impressus—W.F.B., May 23
rufipes—W.F.B., May 23.
Philonthus laminatus—W.F.B., May 6
decorus—W.B.M., Feb. 26.

- politus*—G.T.K.M., Feb. 36.
simetarius—W.F.B., July ?
trossulus—W.F.B., May 26.
æneus—W.F.B., May 26.
Xantholinus linearis—G.T.K.M. and
W.B.M., Mar. 4.
punctulatus—T.N.H.S., May 23.
Lathrobium brunnipes—T.N.H.S.,
May 13.
Sunius angustatus—W.F.B., May 26.
Stillicus rufipes—W.F.B., July ?
Stenus Juno—E.E.de S., Mar. 12.
similis—W.F.B., May 26.
impressus—W.F.B., May 26.
speculator—W.F.B., May 27.
unicolor—H.J.C., Mar. 10.
tarsalis—W.F.B., May 20.
Oxytelus rugosus—W.F.B., May 26.
Lesteva longælitrata—W.F.B., May 13.
brachyelytra—T.N.H.S., May 11.
Homalium rivulare—W.F.B., May 23.
Anthobium sorbi—T.N.H.S., May 13.
torquatum—T.N.H.S., May 25.
Choleva chrysomeloides?—W.F.B.,
May 26.
Watsoni?—E.E.de S., Mar. 13.
fumata—W.F.B., May 22.
sericea—W.F.B., May 16.
Neocrophorus humator—W.F.B., May
16.
Colenis dentipes—W.F.B., July ?
Silpha rugosa—T.N.H.S., Mch. 13.
atrata—W.L.W., Mch. 11.
quadripunctata—W.F.B., June
16.
Hister cadaverinus—W.B.P., Mch. 14.
carbonarius—E.F.B., May 7.
Olibrus geminus—W.F.B., May 3.
Epuræ æstiva—T.N.H.S., May 6.
melanocephala—W.F.B., July ?
Brachypterus urticae—W.F.B., July ?
Nitidula lipustulata—E.K.C., Mar. 17.
Omosita colon—W.F.B., May 16.
discoidea—W.F.B., May 16.
Meligethes picipes—W.F.B., July ?
æneus—J.A.H., Mar. 13.
rufipes—T.N.H.S., May 23.
Cychramus luteus—W.F.B., May 30.
Byturus tomentosus—T.N.H.S., May
13.
Cryptophagus vini—W.F.B., May 22.
Atomaria linearis—W.F.B., May 26.
atricapilla—W.F.B., July ?
Lathridius minutus—T.N.H.S., May
23.
Corticaria gibbosa—W.F.B., May 26.
punctulata—W.F.B., May 26.
Dermestes murinus—G.H.C.B., May
10.
Byrrhus pilula—W.F.B., Nov. ?
Cytilus varius—E.E. de S., Mar. 16.
Aphodius fossor—W.J.F., June 29.
simetarius—W.F.B., May 4.
inquinatus—E.E. de S., Mar. 11.
prodromus—W.F.B., May 11.
depressus—F.E.D.H., Mar. 4.
ater—E.F.B., May 6.
merdarius—W.F.B., May 6.
erraticus—W.F.B., May 6.
punctato-sulcatus—W.F.B., May 6.
Geotrupes stercorarius—E.E. de S.,
Mar. 10.
Melolontha vulgaris—G.W.A., May
18.
Lacon murinus—E.A.S., May 23.
Melanotus rufipes—W.F.B., May 30.
Limoniis minutus—W.F.B., July ?
Althous hæmorrhoidalis—W.F.B.,
May 13.
vittatus—W.F.B., July ?
Corymbites cupreus (male), W.F.B.,
May 23; (female), W.F.B.,

June 26.

Agriotes sobrinus—W.F.B., May 6.
pallidulus—T.N.H.S., May 13.
sputator—W.F.B., May 26.
Campylus linearis—W.F.B., June 24.
Dascillus cervinus—W.F.B., June 11.
Cyphon nitidulus—W.F.B., July ?
variabilis—W.F.B., July ?
Lampyris noctiluca (male); (female),
 H.H.R., June 17.
Telephorus alpinus—L.C.A., May 20.
lividus—W.F.B., June 24.
pellucidus—W.F.B., May 25.
nigricans—W.F.B., May 29.
bicolor—W.F.B., May 25.
limbatus—T.N.H.S., May 13.
pallidus—W.F.B., May 16.
Malachius bipustulatus—W.F.B.,
 May 13.
Malthodes sanguinolentus—W.F.B.,
 May 23.
mysticus—W.F.B., May 23.
Malthinus punctatus—W.F.B., June
 24.
Corynetes violaceus—W.F.B., May 23
Dryophilus pusillus—W.F.B., June 16
Priobium castaneum—W.F.B., May 23
Pyrochroa serraticornis—W.F.B.,
 May 13.
Anaspis frontalis—T.N.H.S., May 13.
rufo-collis—W.F.B., May 25.
melanopa—T.N.H.S., May 13.
fasciata—W.F.B., May 11.
Meloe proscarabeus—H.C.B., Mch.
 30.
Ecdemera lurida—R.W.R., May 21.
Otiorhynchus tenebri-cosus—W.F.B.,
 Mar. 13.
picipes—W.F.B., May 25.
Phyllobius alneti—W.F.B., May 6.
pyri—E.E. de S., Mar. 17.

argentatus—W.F.B., May 6.
oblongus—W.F.B., May 12.
uniformis—W.F.B., May 6.
viridicollis—W.F.B., May 6.
Strophosimus coryli—E.E. de S.,
 Mar 30.
Polydrusus undatus—W.F.B., May
 30.
Sitones suturalis—W.F.B., May 23.
puncticollis—E.E. de S., Mar. 10.
lineatus—E.K.C., Mar. 19.
sulcifrons—W.F.B., May 20.
tibialis—W.F.B., May 6.
Hypera rumicis—W.F.B., Mar. 12.
Balaninus glandium—W.F.B., May 13.
pyrrhoceras—W.F.B., July 7.
Anthonomus pedicularius—T.N.H.S.,
 May 13.
Orchestes quercus—W.F.B., May 6.
fagi—W.F.B., May 6.
salicis—W.F.B., June 24.
stigma—W.F.B., July ?
Phytonomus nigrirostris—E.E. de S.,
 Mch. 13.
Cæliodes quadrimaculatus—E.E.
 de S., Mch. 18.
quercus—W.F.B., June 24.
Centhorhynchus contractus—E.E.
 de S., Mch. 13.
echii—W.F.B., May 13.
pollianrius—W.F.B., July ?
Centhorhynchideus troglodytes—
 W.F.B., July ?
Apion carduorum—W.F.B., July ?
fagi—W.F.B., July ?
oethiops—T.A.P., Mch. 16.
violaceum—W.F.B., May 13.
hydrolapathi—W.F.B., May 13.
punctigerum—W.F.B., May 13.
virens—T.N.H.S., May 23.
humile—W.F.B., July ?

- flavipes*—W.F.B., May 6.
miniaturum—G.T.K.M., Feb. 26.
ceneum—W.F.B., July
ervi—W.F.B., July
Rhynchites betulae—T.N.H.S., May 13.
Apoderus Coryli—T.N.H.S., May 10.
Eirrhinus acridulus—T.A.P., Mch. 19.
vorax—T.N.H.S., May 23.
maculatus—W.F.B., July ?
Anoplus plantaris—W.F.B., July ?
Liosomus ovatulus—W.F.B., May 6.
Barypelthas brunnipes—W.F.B., June 24.
Sciaphilus muricatus—W.F.B., May 26.
Toxotus meridianus—W.B.P., July 22.
Strangalia melanura—W.F.B., June 20.
Grammoptera tabacicolor—W.F.B., May 26.
Rhagium bifasciatum—W.F.B., May 26.
inquisitor—W.F.B., June 20.
Donacia sericea—R.A.W., May 12.
Lema cyanella—R.A.W., Mch. 19.
melanopa—W.F.B., May 26.
Clythra quadripunctata—W.F.B., June 11.
Cryptocephalus aureolus—H.F.D.B., June 9.
Timarcha loevigata.
coriaria—G.T.K.M. and W.B.M., Feb. 26.
Chrysomela staphylaea—V.A.B., May 4.
polita—T.A.P., Mch. 16.
hoemoptera—E.E. de S., Mch. 18.
lamina ?—T.N.H.S., May 23.
Gastrophysa polygoni—W.F.B., Mch. 13.
Luperus flavipes—W.F.B., May 6.
Mantura rustica—W.F.B., May 26.
Prasocuris marginella—W.F.B., May 11.
Adimonia sanguinea—W.F.B., May 25.
Apteropeda graminis—W.F.B., May 26.
Crepidodera rufipes—W.F.B., May 20.
Podagricus fuscicornis—H.F.D.B., May 10.
Aphthona venustula—W.F.B., July ?
Phaedon phellandrii—R.A.W., May 14.
tumidulum—W.F.B., May 22.
Sphaeroderma cardui—W.F.B., May 11.
Phyllotreta undulata—E.E. de S., Mar. 18.
memorum—W.F.B., June 30.
Plectroscelis concinna—T.A.P., Mar. 16.
Thyamis lurida—W.F.B., May 26.
fuscicollis—W.F.B., July ?
Cassida viridis—T.N.H.S., May 13.
vibex—W.F.B., May 23.
Coccinella bipunctata—T.N.H.S., Mar. 13.
variabilis—W.F.B., May 6.
guttata—W.F.B., June 20.
punctata—W.F.B., Mar. 13.
Scymnus discoideus—W.F.B., May 26.

THE BOTANICAL SECTION.

THE past season has been a very extraordinary one. The very mild winter did not kill off the old plants, and consequently "survivals" were very frequent; and, in addition, the unusual warmth of the winter months brought on plants very fast, and in many cases it has been a matter of great difficulty to decide when the proper flowering began. Workers have been very few, but R. W. Rickards has, as usual, been very vigorous, and to him we are indebted for many of our notices. As a proof of the mildness of the winter, no less than 130 different plants were found in flower in January in various parts of the South of England, of which 50 were found at Marlborough. Of these 50, 26 are not unusual at that time of year, and 7 have never been found in a January before, as far as our records extend; these are *Ranunculus auricomus*, *Galium Aparine*, *Sherardia arvensis*, *Myosotis arvensis*, *Dactylis glomerata*, and *Lolium perenne*.

In February the number of species in flower had increased to 63, but some few of these must be credited to January, as they had escaped detection before, and, when found, had evidently been in fair flower all the winter; still several fresh species came on as others died out, and plants were in flower far before their usual time.

By March many of the spring flowers had bloomed, and though a fine month, the average state of flowering was only 18 days earlier than usual.

The unfortunate break caused by the holidays in April was compensated by the kind exertions of Mrs. Gwillim and her family, so that our Records were unbroken, and proved that the early flowering was still kept up.

From this time the difficulty of deciding when a plant was properly in flower was very great, for the ungenial weather checked vegetation, so that a specimen might be found in flower or coloured bud in May and yet a second specimen not be found till weeks afterwards. Thus *Torilis Anthriscus* was found in bud on May 13, nearly out May 30, first flower not till July 1st. *Scrophularia nodosa*, coloured bud May 13th, flower June 15th. *Carduus acaulis* bud June 8th, one specimen June 16th, next July 28th. But though vegetation was checked, the flowering, when it did appear, was magnificent and the colours of the blooms unusually brilliant; and seldom have the grasses been seen in greater perfection, bad as the weather proved for Haymaking.

The bad weather proved also very detrimental to Botanising, and though our List of Notices is up to the mark, it has only been obtained by real hard

work, whilst our investigations on the duration of flowering have suffered a good deal. The Rev. J. Sowerby, as usual, helped us considerably in the October term, at which time the Botanical energy of the school had entirely died out. In October 292 plants were found, but towards the end of the month plants were going off fast; thus, in a walk taken on October 3rd, 204 plants were found in flower, whilst only 129 were found in the same round on October 31st.

In November 63 were found, which were, in a few instances, killed off by the severe cold in the first half of December, but the number has kept fairly steady since then.

In January plants were 16 days before the mean of the previous 18 years; in February, 40 days; in March, 18 days; in April, 18 days; in May, 9 days; in June, 4 days later; in July, 7 days later.

Names of those whose Initials occur in the following list :

E.B.B.	...	...	E. B. Badcock.
E.F.B.	...	...	E. F. Benson.
A.S.B.	...	...	A. S. Berwick.
P.E.B.	...	...	P. E. Bucknall.
E.G.C.	...	...	E. G. Chambers.
E.K.C.	...	...	E. K. Chambers.
G.W.D.L.	...	...	Rev. G. W. De Lisle.
E.N.G.	...	...	E. N. Gardiner.
C.G.G.	...	...	C. G. Green.
H.J.G.	...	...	H. J. Grummitt.
K.G.	...	...	Miss K. Gwillim.
F.E.H.	...	...	F. E. Hulme, Esq., F.L.S.
S.R.K.	...	...	S. R. Knight, Esq.
H.G.A.L.	...	...	H. G. A. Leveson.
W.H.M.	...	...	W. H. Macdonald, Esq.
P.H.M.	...	...	P. H. Maddock.
E.A.M.	...	...	E. A. Molony.
H.C.R.	...	...	H. C. Rendle.
H.B.R.	...	...	H. B. Rickards.
R.W.R.	...	...	R. W. Rickards.
T.N.H.S.	...	...	Rev. T. N. H. Smith.
F.E.T.	...	...	F. E. Thompson, Esq.
C.E.T.	...	...	Rev. C. E. Thorpe.
R.A.W.	...	...	R. A. Waddilove.

- Clematis*
Vitalba ... bud July 14
Thalictrum
flavum June 9
Anemone
nemorosa ... February 22, R.W.R.;
E.B.B.
Myosurus
minimus ... full May 9, E.B.B.
Ranunculus
peltatus March 17
b. floribundus March 23, F.E.T.
openicillatus March 30
aceleratus ... June 9
Flammula ... June 11, E.K.C.
auricomus ... February 22, R.W.R.
(some out all the
year)
acris Mch 14, E.B.B.
repens Ap. 13, K.G.
bulbosus ... Mch. 1, R.W.R.
parviflorus... by Ap. 1, R.W.R.
arvensis..... May 20 (Pewsey,
May 13)
Ficaria Jan. 4, F.E.T.
Caltha
palustris ... Jan. 27, R.W.R.,
Helleborus
viridis Jan. 26, R.W.R.
Aquilegia
vulgaris..... May 13
Papaver
Rhœas May 5, W.H.M.
dubium
a *Lamottei* June 11
b. *Lecoqii* June 3, E.K.C.
Argemone ... June 13, E.K.C.
(Pewsey)
Chelidonium
majus..... Ap. 30, E.K.C.
Fumaria
officinalis ... Feb. 22, R.W.R.
Raphanus
Raphanis-
trum May 29, R.W.R.
(Pewsey, May 13)
Sinapis
arvensis..... all the year
alba Mch 30
Brassica
[*oleracea*]... Ap. 5
[*Rutabaga*] by May 2
[*Rapa*] (Jan. 30, R.W.R.);
May 2
Diploaxis
muralis May 5 (cult)
Sisymbrium
officinale ... May 4, F.E.T.
Alliaria Ap. 11, K.G.
Cardamino
pratensis ... Mch. 14, E.B.B.
hirsuta Jan. 18, F.E.T.
sylvatica ... by May 2
Arabis
thaliana..... full May 9, R.W.R.
hirsuta May 23, R.W.R.
Barbarea
vulgaris May 4
Nasturtium
officinale ... May 27, F.E.T.
palustre..... May 23, R.W.R.
[*Armoracia*
rusticana]... by Jn. 16, R.W.R.
Draba
verna Jn. 20, F.E.T.
Capsella
Bursa-pastoris all the year
Lepidium
campestre ... Ap. 30, E.G.C.
Senebiera
[*didyma*] ... full May 13, F.E.T.
Coronopus... May 2

- Roseda*
lutea Jn. 3, F.E.T.
Helianthemum
vulgare May 9, R.W.R.
Viola
odorata Feb. 27, R.W.R.
b. alba Feb. 28
hirta Mch. 13, R.W.R.
sylvatica
a. Riviniana Mch. 26, R.W.R.
b. Reichenbachiana ... Mch. 9, R.W.R.
tricolor
b. arvensis... all the year
Polygala
vulgaris May 12
oxyptera ... by May 16
depressa ... May 9
calcareae..... by Ap. 30, P.H.M.
Silene
inflata June 1, R.W.R.
Lychnis
vespertina... May 6, R.W.R.
diurna Ap. 3, C.G.G.; Mch. 17 (Chiseldon) F.E.T.
Flos-cuculi by May 16, E.B.B.
Githago May 13, E.K.C. (Pewsey); Jy. 1, H.B.R.
Mœnchia
erecta..... full May 22, G.W.D.L.
Cerastium
glomeratum about Ap. 13
triviale all the year
Stellaria
media..... all the year
Holostea ... Mch 11, W.H.M.
graminea ... May 29, Mrs. L. Burd.
uliginosa ... May 6, R.W.R.
Arenaria
trinervis ... Ap. 6
serpyllifolia May 6
Sagina
procumbens May 4, E.B.B.
Spergula
arvensis..... May 13, R.W.R.
Scleranthus
annuus All the year.
Montia
fontana Mch. 31
Hypericum
perforatum Jy. 14, G.W.D.L.
tetrapterum Jy. 2 (cult)
humifusum about Jy. 20 (cult)
pulchrum ... by Jy. 8
hirsutum ... Jy. 7
Malva
moschata ... Jy. 10, R.A.W.
sylvestris ... Jn. 11, G.W.D.L.
rotundifolia May 2
[Tilia
intermedia] Jy. 8, R.W.R.
Linum
catharticum May 9, R.W.R.
Geranium
phæum May 5, R.W.R.
pratense..... May 28, S.R.K.
pyrenaicum May 21
molle Ap. 1, R.W.R., Ap. 27
rotundifolium May 21
dissectum ... May 9, S.R.K.
columbinum May 27, F.E.T.
lucidum by Ap. 28, E.K.C.
Robertianum Ap. 7, K.G. (Chiseldon) Mch. 17, F.E.T.)
Erodium
cicutarium... full May 7, E.K.C.
Oxalis
Acetosella .. Mch. 24, R.W.R.
Ilex
Aquifolium May 6, R.W.R.

- Euonymus*
europæus ... May 9, E.K.C.; May 16, R.W.R.
Rhamnus
catharticus May 29, R.W.R.
Acer
Pseudo-platanus by May 2
campestre ... Ap. 27
Ulex
europæus ... all the year till end of June; Oct. 12
Gallii Oct. 10
Sarothamnus
scoparius ... by May 5
Ononis
arvensis..... Jy. 10, R.A.W.
Anthyllis
vulneraria ... May 9, R.W.R.
Medicago
lupulina Ap. 30, R.W.R.
Melilotus
officinalis ... Jy. 7, E.K.C.
Trifolium
pratense ... by Ap. 30, P.H.M.
[incarnatum] May 13
striatum..... Jn. 15
hybridum ... Jy. 1, H.C.B.
repens May 13, H.B.R.
procumbens Jn. 2
minus Mch. 26, R.W.R.
Lotus
corniculatus May 11, R.W.R.
major..... Jy 25, R.W.R.
Ornithopus
perpusillus... Jn. 11, R.W.R.
Hippocrepis
comosa May 13, H.B.R.
Onobrychis
sativa..... May 16
Vicia
hirsuta by Ap. 27
tetrasperma Jn 9
Cracca Jy 1, E.K.C.
sylvatica ... Jn. 9
sepium Ap. 14, K.G.
[sativa]..... Ap. 30, E.K.C.
angustifolia May 6, R.W.R.
Lathyrus
pratensis ... about May 30
Orobus
tuberosus ... Ap. 21, K.G.
Prunus
spinosa Mch. 9, E.B.B.
Avium Ap. 11, K.G.
Spiræa
Ulmaria..... Jn. 8, R.W.R.
Filipendula... about Jn. 8 (cult)
Agrimonia
Eupatoria ... Jy.1, R.W.R.
Poterium
Sanguisorba Ap. 30, R.W.R.
Alchemilla
arvensis..... Mch. 7, R.W.R.
vulgaris..... Ap. 30, E.G.C.
Potentilla
Fragarias-
trum all the year
Tormentilla May 4, G.W.D.L.
reptans Jn. 30, R.W.R.
anserina..... May 6, R.W.R.
Fragaria
vesca Mch. 26, R.W.R.
Rubus
Idæus..... May 22, R.W.R.
discolor Jy. 1, R.W.R.
corylifolius Jy. 8
cæsius May 18, R.W.R.
Geum
urbanum ... Ap. 4
intermedium May 9, R.W.R.
rivale May 2

- Rosa*
tomentosa ... about Jn. 20
canina May 28, E.F.B.
arvensis Jn. 13, R.W.R.
Cratægus
Oxyacantha May 2, Miss Blomfield
Pyrus
Malus May 7, E.K.C.
Aucuparia ... May 7, C.E.T.
Epilobium
angustifolium Jy. 15, R.W.R.
hirsutum ... Jy. 26
parviflorum (coloured bud) Jy. 1,
R.W.R.
montanum ... Jn. 10, R.W.R.
Circæa
lutetiana ... Jy. 9
Callitriche
verna by May 9, T.N.H.S.
Bryonia
dioica Jn. 15
Ribes
Grossularia Mch. 13, F.E.T.
rubrum Mch. 29, R.W.R.
Sedum
acre Jn. 15
Saxifraga
tridactylites Mch. 14, E.B.B.
granulata ... Ap. 11, K.G.
Chrysosplenium
oppositifolium Mch. 12 (cult) F.E.T.;
Mch. 18 (Chiseldon)
Sanicula
europæa May 2
Helosciadium
nodiflorum ... Jy. 1, R.W.R.
inundatum ... by Jn. 11, E.K.C.
Ægopodium
Podagraria ... May 29, R.W.R.
Bunium
flexuosum ... Ap. 30, R.W.R.
Pimpinella
Saxifraga ... Jy. 8
Cenanthe
crocata May 18, R.W.R.
Æthusa
Cynapium ... Jn. 9
Silaus
pratensis ... full Jy. 10, R.W.R.
Angelica
sylvestris ... Jy. 7
Pastinaca
sativa by Jn. 15
Heracleum
Sphondylium May 11, R.W.R.
Daucus
Carota Jn. 11, R.W.R.
Torilis
infesta by May 13, R.W.R.;
E.K.C.
Anthriscus ... Jy. 1
Chærophyllyum
sylvestre ... Mch. 8, W.H.M.
temulum ... May 6, R.W.R.
Scandix
Pecten-
Veneris ... Ap. 30 (all the year)
Conium
maculatum Jn. 20, R.W.R.
Hodera
Helix Oct. 7
Cornus
sanguinea ... Jn. 11, R.W.R.
Adoxa
Moschatellina Feb. 20, R.W.R.
Sambucus
nigra May 16, R.W.R.
Viburnum
Opulus Jn. 1, R.W.R.
Lantana Ap. 21, K.G.
Lonicera

- Periclymenum Jn. 8, R.W.R.
 Galium
 cruciatum ... Mch. 26, R.W.R.
 verum Jy. 7, R.W.R.
 Mollugo Jn. 11
 saxatile Jn. 2, G.W.D.L.
 palustre Jn. 20 (Ramsbury)
 Aparine Ap. 27
 tricorne May 16
 Asperula
 odorata Ap. 21, K.G.
 cynanchica Jn. 16, R.W.R.
 Sherardia
 arvensis..... Mch. 14, R.W.R.
 Valeriana
 dioica by May 2
 officinalis ... Jn. 1, R.W.R.
 Valerianella
 olitoria Ap. 30, E.K.C., Jn. 15
 Dipsacus
 sylvestris ... Aug. 1
 Scabiosa
 succisa (coloured bud) Aug. 1
 columbaria... Jn. 27, H.G.A.L.
 arvensis Jn. 11, E.K.C.
 Carduus
 nutans May 28, S.R.K.
 crispus May 21, R.W.R.
 lanceolatus Jy. 15
 eriphorus... bud Jy. 20
 palustris ... May 29
 acaulis Jn. 16, R.W.R.; by
 Jy. 28
 arvensis Jy. 20, R.W.R.
 Arctium
 nemorosum Jy. 20
 Serratula
 tinctoria..... Jy. 26
 Centaurea
 nigra by Jy. 7
 Scabiosa..... Jn. 11
 Cyanus..... Jn. 26 F.E.H.
 Chrysanthemum
 segetum..... May 13, R.W.R.
 Leucanthe-
 mum May 11, R.W.R.
 Matricaria
 Parthenium Jn. 4, F.E.T.
 inodora May 4
 Anthemis
 Cotula Jy. 1, R.W.R.
 arvensis..... Jn. 16, R.W.R.
 Achillea
 Millefolium Jn. 1, R.W.R.
 Artemisia
 vulgaris ... Aug. 1 (cult)
 Filago
 germanica... bud Jy. 10, R.W.R.
 Senecio
 vulgaris all the year
 erucifolius... Jy. 15, R.W.R.
 Jacobæa..... Jy. 10, R.W.R.
 aquaticus ... Jy. 1, R.W.R.
 Bellis
 perennis..... all the year
 Erigeron
 acris May 13, F.E.T.
 Tussilago
 Farfara Feb. 7, R.W.R.
 Petasites
 vulgaris..... Jan. 17
 Lapsana
 communis ... Jn. 20, R.W.R., Jy. 1
 Hypochaeris
 radicata..... May 18, (Pewsey)
 R.W.R.; by May
 13 (Marlborough)
 Leontodon
 hirtus Jy. 14
 hispidus May 18, R.W.R.
 autumnalis by Jy. 1, T.N.H.S.

- Picris**
hieracioides Aug. 1
Tragopogon
pratensis ... May 13, F.E.T.
Taraxacum
officinale ... all the year
Sonchus
oleraceus ... full May 10, R.W.R.
asper May 6, R.W.R.
arvensis by Aug. 1
Crepis
virens May 11, R.W.R.
Hieracium
Pilosella ... May 9
vulgatum ... by July 8
boreale bud Aug. 1
Phyteuma
orbiculare ... Jy. 10, R.W.R.
Campanula
glomerata ... Jy. 9, S.R.K., H.J.G.
Trachelium Jy. 12, G.W.D.L.
rotundifolia Jy. 15, S.R.K.
Specularia
hybrida full Jn. 3, H.B.R.
Fraxinus
excelsior ... Mch. 30
Ligustrum
vulgare by Jn. 24, R.W.R.
Vinca
[major] Ap. 30, R.W.R.
minor by Jan. 18
Erythraea
Centaurium Jy. 26
Gentiana
Amarella ... May 26, R.W.R.
campestris Sep. 17, E.A.M.
Menyanthes
trifoliata ... by May 8, F.E.T.
Convolvulus
arvensis Jy. 1, H.B.R.
sopium Jy. 8.
- Solanum**
Dulcamara Jn. 3, E.K.C., Jn. 16, R.W.R.
[Hyoscyamus niger] about Jn. 2
Verbascum
Thapsus Jy. 1, E.K.C.
Thapso-nigrum Jn. 28 (cult)
Scrophularia
Balbisia June 14.
nodosa June 15.
Linaria
Cymbalaria Feb. 9, E.B.B.; May 9, E.K.C.
vulgaris ... June 26, F.E.H.
minor Jy. 1, P.E.B
Veronica
hederifolia all the year.
polita all the year.
Buxbaumii all the year.
arvensis ... all the year.
serpyllifolia Ap. 1.
officinalis ... by May 13, R.W.R.; J.S.W.
Chamædrys Mch. 30, W.H.M.
montana ... by May 21, R.W.R.
Anagallis ... June 9.
Beccabunga May 16, R.W.R.; J.S.W.
- Euphrasia**
officinalis ... May 13, E.K.C.
Bartsia
Odontites ... June 20, R.W.R.
Pedicularis
sylvatica ... about Ap. 17, Mrs. Tanner.
Rhinanthus
Crista-galli May 11, R.W.R.
Melampyrum
patense May 29, E.B.B.
Lathraea

- squamaria* Mch. 12, A.S.B.
Orobanche
 minor..... May 30, W.H.M.
Verbena
 officinalis ... by Aug. 1.
Mentha
 arvensis Jy. 23, R.W.R.
Thymus
 Serpyllum... June 6, R.W.R.
 Chamaedrys by June 16.
Calamintha
 Clinopodium Jy. 20.
 Acinos Jy. 8 (Amesbury),
 T.N.H.S.
 menthifolia by Aug. 1; Jy. 14
 (cult.)
Nepeta
 Glechoma ... Jan. 22, K.G.; Mch.
 9, R.W.R.
 [Salvia
 Verbenaca] May 13.
Prunella
 vulgaris ... June 28.
Scutellaria
 galericulata Jy. 1, R.W.R.
Ballota
 nigra..... Jy. 26, R.W.R.
Stachys
 Betonica ... by Jy. 8.
 sylvatica ... June 3, S.R.K.
Galeopsis
 Ladanum ... Jy. 15, R.W.R.
 Tetrahit ... Jy. 10, R.W.R.
Lamium
 amplexicaule all the year.
 purpureum all the year.
 album all the year.
 Galeobdolon Ap. 14, K.G.
Ajuga
 reptans Ap. 11, K.G.
Lithospermum
- officinale* ... May 4.
arvense May 2.
Myosotis
 palustris ... June 9.
 arvensis..... Mch. 30.
 collina Mch. 7, R.W.R.
 versicolor ... Ap. 20, K.G.
Anchusa
 arvensis..... by May 13, R.W.R.
Symphytum
 officinale ... Ap. 13, K.G.
Cynoglossum
 officinale ... full June 8, R.W.R.
Primula
 vulgaris ... all the year.
 officinalis ... Mch. 16, W.H.M.
Lysimachia
 Nummularia June 13 (cult.)
 nemorum ... about May 25, R.W.R.
Anagallis
 arvensis ... May 13, H.B.R.
Plantago
 major June 9, R.W.R.
 media May 16.
 lanceolata... Mch. 30, F.E.T.
Chenopodium
 album Jy. 15, R.W.R.
 B. Henricus May 23, R.W.R.
Atriplex
 angustifolia Jy. 15, R.W.R.
Rumex
 conglomera-
 tus Jy. 8.
 a. viridis ... Jy. 1.
 obtusifolius June 3, R.W.R.
 crispus June 9, R.W.R.
 Hydrolapa-
 thum Jy. 12.
 Acetosa ... May 4.
 Acetosella May 9, R.W.R.
Polygonum

- Convolvulus* Jy. 15, R.W.R.
aviculare ... June 3, R.W.R.
Persicaria ... Jy. 8.
amphibium Jy. 8.
Bistorta ... full May 29.
Daphne
Laureola ... Jan. 18, F.E.T.
[Buxus
sempervirens Feb. 22, W.H.M.
Euphorbia
Helioscopia all the year.
amygdaloides Mch. 25, G.W.D.L.
Peplus about Jy. 3.
exigua Jy. 1, R.W.R.
Mercurialis
perennis ... barren, Jan. 4; fertile,
Feb. 8, R.W.R.
Urtica
dioica May 13, R.W.R.
urens Mch. 4.
Ulmus
suberosa ... Feb. 22, R.W.R.
montana ... Feb. 24.
Quercus
Robur about May 20.
Fagus
sylvatica ... May 2, R.W.R.
Corylus
Avellana ... Jan. 17; Jan. 23.
Betula
alba about Ap. 19.
Populus
nigra Feb. 22, E.B.B.
Salix
fragilis Ap. 7.
purpurea ... Mch. 12, F.E.T.
viminialis ... Feb. 28, R.W.R.
cinerea Mch. 28.
caprea Mch. 1, R.W.R.
Pinus
sylvestris ... May 13.
- Taxus*
baccata Jan. 31, R.W.R.
Arum
maculatum Mch. 29, R.W.R.
Potamogeton
natans June 16.
Alisma
Plantago ... well out June 27,
W.H.M.
Orchis
pyramidalis June 11, E.K.C.
ustulata by May 13, R.W.R.
Morio Ap. 30, E.K.C.
mascula Ap. 1, C.G.G.
incarnata ... full Jy. 1, T.N.H.S.
maculata ... May 30, R.W.R.
Gymnadenia
conopsea ... June 1, R.W.R.
Habenaria
viridis June 23, P.H.M.;
Jy. 23, R.W.R.
chlorantha about May 22.
Herminium
Monorchis ... June 9, (cult.); June
23, P.H.M.
Ophrys
apifera by June 16, R.W.R.
ovata May 7, P.H.M.
Cephalanthera
grandiflora about May 22, E.B.B.
Iris
foetidissima June 21 (cult.)
Pseudacorus May 27.
Narcissus
Pseudo-narcis-
sus Feb. 21.
Galanthus
nivalis Jan. 17.
Tamus
communis ... May 29, E.B.B.
Polygonatum

- multiflorum May 9, E.K.C. (Ramsbury).
 [Ruscus
 aculeatus]... Jan. 30, R.W.R.
 [Tulipa
 sylvestris]... Mch. 29, R.W.R.
 Ornithogalum
 umbellatum May 16, R.W.R.
 pyrenaicum June 9 (cult.)
 Scilla
 nutans March 21, C.E.T.
 Allium
 ursinum..... May 9.
 Colchicum
 autumnale Oct. 3.
 Luzula
 pilosa..... Mch. 2, F.E.T.
 campestris Mch. 14, R.W.R.
 Juncus
 effusus Jy. 1.
 bufonius ... Jy. 8.
 Scirpus
 palustris ... by June 3, R.W.R.
 lacustris ... by June 20, R.W.R.
 Carex
 paniculata... full May 2.
 muricata ... May 4.
 ovalis..... June 11, R.W.R.
 glauca Ap. 21, K.G.
 pilulifera ... seed May 6, R.W.R.
 præcox May 4.
 pendula ... about May 6 (cult.)
 sylvatica ... by May 4.
 hirta May 16.
 paludosa ... about May 6.
 riparia about Ap. 30.
 Anthoxanthum
 odoratum ... Mch. 30, F.E.T.
 Digraphis
 arundinacea June 9.
 Alopecurus
 agrestis May 6.
 geniculatus by May 20.
 pratensis ... Ap. 6.
 Phleum
 pratense ... June 15.
 Agrostis
 alba Jy. 12.
 vulgaris..... June 15.
 Milium
 effusum..... Ap. 27.
 Aira
 cæspitosa ... June 3, R.W.R.
 Avena
 flavescons ... May 30, E.B.B.
 pubescens May 6.
 pratensis ... Ap. 27.
 elatior May 29.
 Holcus
 mollis June 15.
 lanatus May 4.
 Koeleria
 cristata May 30, E.B.B.
 Melica
 uniflora Ap. 27.
 Catabrosa
 aquatica ... by Jy. 12.
 Glyceria
 fluitans May 9, E.B.B.
 plicata June 3.
 aquatica ... June 20.
 Poa
 annua all the year.
 nemoralis ... full June 20.
 compressa... June 15.
 pratensis ... by Ap. 27.
 trivialis May 16; May 13
 (Savernake).
 Briza
 media..... May 16, E.N.G.
 Cynosurus
 cristatus ... May 29.

Dactylis

glomerata ... May 11, R.W.R.

Festuca

ovina May 6.

rubra May 6.

clatior

b.arundinacea May 29.

pratensis ... June 15.

b. loliacea... about June 13.

Bromus

giganteus ... Jy. 14.

asper June 11.

erectus Ap. 27.

sterilis May 4.

racemosus... full June 9.

mollis..... Ap. 27.

Brachypodium

sylvaticum Jy. 1.

Triticum

caninum ... June 20.

repens June 15.

Lolium

perenne ... Ap. 27.

[*italicum*]... by May 20.

Hordeum

pratense ... by Jy. 7.

Botrychium

Lunaria ... Ap. 30, P.H.M.

Equisetum

arvense Ap. 6.

palustre..... May 16, E.B.B.

limosum ... May 13.

CULTIVATED SPECIES.

Eranthis hiemalis—Jan. 10.

Geranium sanguineum—Ap. 27.

Geranium sylvaticum—May 21.

Corydalis solida—Mch. 5.

Saxifraga crassifolia—Feb. 19.

Ribes sanguineum—Mch. 8.

Orobis vernus—Mch. 9.

Cytisus Laburnum—May 3.

Staphylea pinnata—Ap. 26.

Cornus mas—Feb. 1.

Syringa vulgaris (Lilac)—Ap. 28.

Pyrus Japonica—Nov. 23, 1881.

Pulmonaria officinalis—Feb. 20.

Larix europæa—about Mch. 10.

Daphne mezereum—Jan. 20.

Apricot—Feb. 23.

Crocus—Jan. 3.

Rye—May 6, R.W.R.

Oats—June 8.

ORNITHOLOGICAL SECTION.

DURING the past season the number of notices has largely surpassed those of the previous one. This is, of course, a sign of increased care in observing and reporting. The number of rarities has been small, although one would have expected that the frequent and heavy gales would have driven in many birds that do not usually visit the Marlborough woods and downs. A Skua Gull, however, was captured near Collingbourne in November, and the warm winter has produced an extraordinarily early nest of Blackbirds, found near Axford, on January 15th, by Mr. J. Cripps. As to the papers and lectures in connection with the section, the great difficulty has been to find more than one or two who care for any ornithology that goes beyond bird's-nesting. Cardew was good enough to come to our assistance, while G. T. K. Maurice, besides obtaining the largest number of notices, also read an admirable paper before the assembled society. The paper was most interesting, and none the less so because it embodied many results of personal observation, and gave ground for hoping that his present ornithological studies will bear good fruit some day. We hope that others may follow his example. They will not be sorry for it, especially if their lot is some day cast in a place where they may benefit the cause of science, and find wholesome amusement for their leisure time in following out the pursuits of their younger days.

Key to the Initials.

E.B.B.	...	...	E. B. Badcock.
J.R.C.	...	...	J. R. Cardew.
W.H.C.	...	...	W. H. Coats.
C.E.C.	...	...	C. E. Cooper.
E.B.D.	...	...	E. B. Dawson.
E.F.E.	...	...	E. F. Everett.
J.H.H.	...	...	J. H. Hayward.
P.H.S.	...	...	P. Horton-Smith.
A.E.R.M.	...	...	A. E. R. Mangles.
D.J.M.	...	...	D. J. Mounsey.
C.B.R.	...	...	C. B. Rawlinson.
R.W.R.	...	...	R. W. Rickards.
W.B.S.	...	...	W. B. Silver.
G.A.C.S.	...	...	G. A. C. Sim.
A.G.T.	...	...	A. G. Thynne.
J.P.W.	...	...	Rev. J. P. Way.
A.W.A.W....	...	...	A. W. A. Williams.

S.G.W.	...	...	S. G. Williams.
W.W.	...	...	W. Wilson.
J.S.W.	...	...	J. S. Wilson.

The notices without initials have been chiefly obtained through the aid of Mr. Coleman.

Appended is the list of notices :—

- Kestrel, *Falco Tinnunculus*—May 13, 3 eggs, G.T.K.M. and C.E.C.
Missel Thrush, *Turdus Viscivorus*—May 13, eggs, J.S.W.
Song Thrush, *Turdus Musicus*—March 28, 9 eggs, A.C.S. (?); young May 31, W.B.S.
Blackbird, *Turdus merula*—April 6, 3 eggs, G.T.K.M.; 3 young April 20, G.T.K.M.; January 15, 1883, a nest of young blackbirds found at Axford.
Redbreast, *Erythaca rubecula*—March 17, 2 eggs, E.B.D.; young May 28, G.T.K.M., E.B.B.
Redstart, *Phoenicurea ruticilla*—May 6, 2 eggs, C.E.C.
Grasshopper Warbler, *Salicaria locustella*—June 10, 5 eggs, W.H.C.; seen May 31, G.A.C.S.
Sedge Warbler, *Salicaria phragmites*—May 13, 4 eggs, A.E.R.
Garden Warbler, *Curruca hortensis*—May 24, 3 eggs, W.H.C.
Whitethroat, *Curruca cinerea*—May 17, 5 eggs, E.F.E.
Willow Warbler, *Sylvia trochilus*—May 11, 2 eggs, W.H.C.; seen March 29, D.J.M.
Chiff-Chaff, *Sylvia hippolais*—May 19, 6 eggs, G.T.K.M.; young June 3, G.T.K.M.
Golden-crested Regulus, *Regulus cristatus*—June 25, 8 eggs, A.E.R.M.; young May 4, A.W.A.W.
Greater Tit, *Parus major*—April 30, 9 eggs, G.T.K.M. and C.E.C.
Blue Tit, *Parus caeruleus*—young May 14, G.A.C.S.
Cole Tit, *Parus ater*—May 1, 11 eggs, G.A.C.S. (?)
Long-tailed Tit, *Parus caudatus*—March 4, nest, C.E.C.; young May 9, G.T.K.M.
Pied Wagtail, *Motacilla alba*—June 11, 5 eggs and a cuckoo, A.G.T.
Tree Pipit, *Anthus arboreus*—May 23, 5 eggs, G.T.K.M.
Meadow Pipit, *Anthus pratensis*—May 21, eggs, J.R.C.
Skylark, *Alauda arvensis*—February 11, song, R.W.R.
Bunting, *Emberiza miliaria*—June 15, 4 eggs, E.B.D.
Heron, *Ardea cinerea*—April 20, 1 egg, Mr. Coleman.
Black-headed Bunting, *Emberiza schoeniclus*—May 11, 3 eggs, A.E.R.M.; young June 18, A.E.R.M.

Yellow Bunting, *Emberiza citrinella*—May 13, 3 eggs, J.P.W.; young June 17, A.E.R.M.

Chaffinch, *Fringilla coelebs*—nest March 3, Mr. Coleman.

House Sparrow, *Passer domesticus*—April 18, 1 egg, E.B.D.; young June 12, E.B.D.

Greenfinch, *Coccothraustes chloris*—May 2, 1 egg, E.B.D.

Goldfinch, *Carduelis elegans*—May 19, eggs, W.W.

Linnet, *Linota cannabina*—May 13, 5 eggs, J.P.W.; young May 13, G.A.P.C.

Bullfinch, *Pyrrhula vulgaris*—May 7, 4 eggs, W.H.C.

Starling, *Sturnus vulgaris*—May 8, 5 eggs, A.E.R.M.; young May 9, G.T.K.M.

Carrion Crow, *Corvus corone*—young May 13, G.T.K.M.

Rook, *Corvus frugilegus*—June 16, (black rook with white wings), E.B.D.; March 5, nesting, G.T.K.M.; March 15, 2 eggs, G.T.K.M. and C.E.C.

Jackdaw, *Corvus monedula*—April 19, 5 eggs, G.T.K.M.

Magpie, *Pica caudata*—April 26, 5 eggs, G.T.K.M.

Jay, *Garrulus glandarius*—May 9, 5 eggs, A.E.R.M.; young May 13, J.H.H.

Creepie, *Certhia familiaris*—young May 23, G.T.K.M. and E.B.B.

Nuthatch, *Sitta europaea*—May 12, eggs, A.E.R.M.

Cuckoo, *Cuculus canorus*—April 21, song, "W. Giddings;" May 21, egg, J.R.C.

Swallow, *Hirundo rustica*—April 7, song, Mr. Coleman; June 3, 5 eggs, G.T.K.M.; young, June 12, E.B.D.

Martin, *Hirundo urbica*—June 3, 4 eggs, G.A.C.S.; young June 12, E.B.D.

Sand Martin, *Hirundo riparia*—May 25, 4 eggs, D.J.M.

Swift, *Cypselus apus*—May 7, song, E.B.B.; last seen (?) Nov. 10, E.B.B. and C.B.R.

Goatsucker, *Caprimulgus Europaeus*—June 16, 2 eggs, E.B.D.

Ring Dove, *Columba palumbus*—May 4, 1 egg, G.T.K.M. and A.W.A.W.

Stock Dove, *Columba oenas*—April 4, 1 egg, G.T.K.M.; 2 young April 27, G.T.K.M.

Turtle Dove, *Columba turtur*—May 22, eggs, P.H.S.

Partridge, *Perdix cinerea*—May 5, 1 egg, G.T.K.M. and C.I.C.; red-legged, July 6, E.B.D.

Peewit, *Vanellus cristatus*—April 4, 3 eggs, G.T.K.M.

Land Rail, *Crex pratensis*—May 2, song, G.T.K.M.; June 17, 6 eggs, W.H.C.

Moorhen, *Gallinula chloropus*—May 9, eggs, G.T.K.M.

Coot, *Fulica atra*—June 11, 5 and 8 eggs, S.G.W.

Little Grebe, *Podiceps minor*—March 16, 1 egg, G.T.K.M.; young May 30, G.T.K.M.

Sea Gull, *Larus canus*—November 2, Mr. Coleman.

Skua Gull, *Lestris catarractes*—November 2, Mr. Coleman.

DONATIONS.

MISCELLANEOUS.

Pair of North American Indian Gloves	R. N. Dundas.
Star Globe	H. V. Thomson.
Pate of Fox killed by Tedworth Hounds in the Court	C. M. Bull, Esq.
Portion of Ivory Tusk from peat at St. John's, Kent	H. Smelt, Esq., O.M.
German Shell from Strasbourg	Mr. Neate.
Sword found at Manton	L. J. Rendel.
Kaffir Assogai	Mr. O. Brown.
Zulu Knob-Kerry, Pipe Head, and Beads	B. L. Reynolds.
Maté Gourds and Pipe	H. G. Comber.
Zulu Bangle	B. C. Waterfield.
Leaf Hat—Chili	H. G. Comber.
Spring Dagger from Pyrenees	B. C. Waterfield.

GEOLOGICAL.

Specimen of Grey Chalk from Channel Tunnel ...	Mr. W. Gale.
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ORNITHOLOGICAL.

Male and Female Night Jar	C. H. Lance.
Nest of Bottle Tit	G. T. K. Maurice.
2 Partridge Eggs—Chili	H. G. Comber.

NUMISMATIC.

12 Japanese Coins in case	W. B. Price.
3 Coins Richard I., Henry II., Edward III.	H. B. Creeke.
Coins (various)	W. A. Rose.
12 Roman Coins from tombs near Egyptian Pyramids	E. A. Stanton.

LIBRARY.

Wood's Field Naturalists' Hand-book	F. E. Hulme, Esq.
Report for 1881 on Injurious Insects	Miss Ormerod.
Woodward's Natural History of English Fossils ...	F. E. Hulme, Esq.

ARCHÆOLOGICAL.

Inscribed Brick from Babylon	H. Rassam, Esq.
Fragment of Bowl from site of New Buildings ...	Rev. J. S. Thomas.
2 Spurs. Musket rest (?), and Horse Shoe from Rockley Down	R. T. Bedford, Esq.

STANTON PRIZES.

THESE Prizes were founded in memory of T. C. Stanton, who died December 13, 1854, to encourage the study of Natural History and Natural Philosophy.

FORMER PRIZEMEN.

1857 R. Bosworth-Smith.	1873 J. C. Brown } <i>Aeq.</i>
1858 A. Robinson.	W.M.H. Milner }
1859 J. J. Pulleine.	1874 A. E. Garrod } <i>Aeq.</i>
1860 A. L. Galabin.	J. G. Molitus }
1861 A. L. Galabin.	1875 J. G. Balfour } <i>Aeq.</i>
1862 G. A. Dicken.	E. S. Marshall }
1863 A. C. Madan.	1876 W. M. H. Milner.
1864 A. C. Madan.	A. J. Burness.
1865 T. L. Croome.	1877 O. Elton.
1866	1878 H. M. Elder.
1867 W. Goodchild } <i>Aeq.</i>	1879 G. W. Butler.
I. N. C. Pope }	1880 P. H. Maddock (Entomological)
1868 F. Giles.	E. N. Gardiner (Botanical).
1869 J. F. Laver.	1881 W. F. H. Blandford (Entomo-
1870 J. B. Fuller.	logical).
1871 J. B. Fuller.	E. K. Chambers (Botanical).
1872 E. Meyrick } <i>Aeq.</i>	1882 E. F. Benson (Entomological).
J. B. Oakley }	E. K. Chambers (Geological).

SUBJECTS FOR 1883.

Alternative Subjects :—

- (1) A collection of Beetles, or of Moths and Butterflies.
- (2) A collection of Plants, sent in in classified order.
- (3) A collection of Plants, with the insects (of all orders) seen to visit the flowers of each species of plant collected.

In the case of (1) and (2) an examination on the arrangement of the specimens, as well as on the localities where, and times when, they were obtained, will have to be passed by each candidate on his own collection.

FEBRUARY, 1882.

Date.	Mean Readg. of Baromtr. reduced to Sea Level.	Temperature.						Wind.			Mean. amt. of Cloud (0-10).	Rain.
		In the Shade.				Highest insun's rays.	Lowest on the grass.	Direction.		Velocity. Miles.		
		High- est.	Lowest	Adop- ted Mean.	Dew Point.			A.M.	P.M.			
1	ins. 30.622	41.0	31.1	34.0	29.1	85.1	22.5	E.	E.S.E.	131	5	in.
2	.567	37.8	26.4	32.8	32.3	45.0	17.5	Calm.	Calm.	50	10	
3	.600	46.0	33.6	37.5	33.9	82.2	22.9	Calm.	Calm.	63	5	
4	.526	45.0	25.3	31.5	27.6	83.5	20.6	Calm.	Calm.	18	4	
5	.471	39.1	30.0	34.8	34.0	50.0	25.4	Calm.	Calm.	18	10	
6	.553	42.1	30.2	35.5	34.1	58.5	26.1	Calm.	Calm.	31	10	
7	.547	43.5	37.6	40.0	37.8	66.6	31.9	E.	E.	80	10	
8	.442	40.1	35.5	37.0	34.1	53.1	30.8	E.S.E.	S.S.E.	121	10	
9	.380	36.9	33.1	34.8	33.7	45.0	30.2	S.	S.	243	10	
10	30.175	45.8	33.9	38.4	36.1	88.1	31.7	S.	S.S.E.	252	5	
11	29.867	46.2	36.3	41.7	39.6	78.2	30.9	S.	S.	236	10	.01
12	30.037	53.2	40.4	44.2	40.5	100.8	28.7	Calm.	S.W.	122	5	
13	.046	51.9	39.4	46.8	45.7	87.0	33.5	S.W.	S.W.	349	5	.06
14	.190	55.0	46.1	49.0	45.8	98.8	41.2	W.	S.W.	174	9	.48
15	.099	49.4	33.7	38.4	33.2	67.3	27.6	Calm.	Calm.	255	5	.15
16	.354	47.7	30.9	40.5	38.9	85.9	23.3	W.	W.N.W.	172	9	
17	.341	49.0	44.3	45.9	42.1	81.0	40.7	W.	W.	182	10	
18	.308	49.1	39.8	43.7	39.9	73.4	35.5	W.	N.W.	193	10	.03
19	.735	49.9	33.0	39.4	32.9	101.0	25.7	N.W.	Calm.	160	0	
20	.810	46.0	31.1	37.6	34.4	72.2	21.9	Calm.	Calm.	87	5	
21	.708	50.3	37.2	44.9	43.4	76.0	31.7	N.W.	Calm.	141	10	
22	.606	54.0	38.2	44.0	40.1	94.9	37.7	Calm.	N.N.W.	64	10	
23	.388	44.9	38.6	40.9	36.3	54.0	37.3	Calm.	Calm.	59	10	
24	30.166	50.3	30.8	39.7	38.0	102.5	21.7	Calm.	S.S.E.	73	10	.04
25	29.618	52.2	43.8	49.5	47.7	60.2	42.0	S.	S.S.W.	391	10	.46
26	.083	52.9	46.3	48.8	46.1	98.0	43.5	S.W.	W.	416	10	.10
27	.255	48.6	43.4	46.2	44.7	72.9	39.3	S.W.	N.W.	190	10	.45
28	29.277	47.8	39.2	44.1	42.4	77.8	32.9	S.E.	S.	168	10	.57
Mns.	30.242	47.0	36.0	40.8	38.0	76.4	30.5	...	...	4439	8.0	Sum 2.35

MARCH, 1882.

Date.	Mean Readg. of Baromtr. reduced to Sea Level.	Temperature.						Wind.			Mean amt. of Cloud (0-10).	Rain.
		In the Shade.				Highest insun's rays.	Lowst. on the grass.	Direction.		Velocity. Miles.		
		High- est.	Lowest	Adop- ted. Mean.	Dew Point.			A.M.	P.M.			
1	ins. 29-051	50°0	40°4	43°7	37°7	100°7	38°6	W.	S.	271	9	in. '41
2	327	48°7	37°5	41°7	34°6	104°6	33°3	S.W.	S.W.	294	2	'02
3	471	46°8	32°2	38°4	34°1	101°7	25°0	Calm.	E.	146	2	
4	734	49°3	28°3	37°5	34°6	93°9	22°7	Calm.	Calm.	85	10	
5	29-692	50°3	40°1	45°9	44°3	75°6	35°9	S.S.W.	W.	215	8	'05
6	30-030	49°9	35°2	41°5	34°9	100°6	26°3	W N W	Calm.	187	6	'02
7	232	58°7	34°3	47°2	47°0	107°7	26°5	S.W.	S.W.	199	10	
8	300	55°1	46°6	50°5	48°0	79°0	41°6	S.W.	S.W.	234	10	'02
9	338	54°1	47°3	50°2	47°2	90°0	44°7	S.W.	S.	265	10	
10	355	55°6	48°1	51°3	49°4	82°0	46°3	S.W.	W.	244	10	'03
11	478	53°1	44°4	47°7	44°7	80°1	43°7	Calm.	Calm.	62	10	'05
12	565	55°9	39°2	44°5	39°2	115°7	28°7	Calm.	Calm.	47	1	
13	598	50°1	31°5	41°6	37°8	103°6	26°8	Calm.	Calm.	48	0	
14	443	57°3	30°1	42°7	38°0	107°7	23°9	Calm.	Calm.	47	0	
15	601	59°2	31°1	45°4	41°0	117°7	23°6	Calm.	Calm.	42	0	
16	650	61°0	33°1	46°8	41°8	108°4	24°4	Calm.	Calm.	57	0	
17	548	63°3	31°4	46°4	39°5	111°6	22°9	Calm.	Calm.	28	0	
18	311	64°1	30°9	46°0	40°6	111°7	23°5	Calm.	Calm.	45	0	
19	30-030	56°9	36°1	45°4	42°0	108°5	34°4	S.W.	S.S.W.	108	3	
20	29-820	59°8	39°8	47°7	41°7	114°7	37°3	S.	W.	224	9	'01
21	29-801	48°7	32°0	39°2	31°7	106°7	30°6	W N W	N.W.	241	2	'06
22	30-198	43°8	28°8	36°2	29°0	94°1	24°1	N.	Calm.	275	5	
23	30-161	49°3	26°2	40°0	35°5	93°6	17°7	Calm.	S.W.	108	7	'02
24	29-744	54°0	44°5	48°7	45°0	101°6	42°4	W S W	W N W	249	6	
25	664	53°0	34°6	44°3	39°7	106°4	27°8	W N W	S.	190	5	'55
26	29-749	49°2	33°8	41°7	32°8	108°5	31°8	N.	NNW	471	1	'01
27	30-202	52°0	33°8	43°1	39°1	97°3	27°6	Calm.	W.	174	10	
28	30-203	51°0	41°4	46°7	44°7	89°0	37°6	W.	W.	115	10	'05
29	29-940	53°5	44°0	48°0	43°3	81°4	40°1	W.	Calm.	205	9	'06
30	646	54°3	38°3	44°3	38°6	111°7	32°6	Calm.	Calm.	106	6	
31	29-615	53°1	31°1	43°1	38°8	111°7	23°5	Calm.	S.	92	5	'50
Mns	30-048	53°6	36°3	44°4	39°9	100°6	31°1	...	...	5072	54	Sum 186

APRIL, 1882.

Date.	Mean Readg of Baromtr. reduced to Sea Level.	Temperature.						Wind.				Rain.
		In the Shade.				Highest insun's on the rays.	Lowst. on the grass.	Direction.		Velocity. Miles.	Mean amt. of Cloud (0-10)	
		High- est.	Lowest	Adop- ted Mean.	Dew Point.			A.M.	P.M.			
1	ins. 29.756	55.2	42.1	47.8	40.2	109.9	38.6	S.	E.	247	9	in. .01
2	.871	57.0	42.4	48.2	44.0	114.6	37.9	S.E.	E.	239	10	
3	29.932	57.9	43.8	48.9	45.0	107.7	43.3	E.	E.	278	5	
4	30.071	54.2	42.3	46.8	40.4	102.6	31.8	E.	Calm.	226	5	
5	.149	46.1	38.2	41.9	40.0	74.8	31.2	N.E.	Calm.	140	10	.04
6	.270	59.0	38.2	46.6	39.4	98.5	34.0	N.E.	Calm.	117	5	
7	.381	59.1	36.2	46.4	37.3	112.0	28.2	E.N.E.	E.	206	0	
8	.348	60.6	34.9	46.8	39.4	114.5	27.9	E.	Calm.	199	0	
9	.267	55.3	35.0	44.5	37.5	110.1	29.3	N.E.	E.N.E.	159	3	
10	30.112	57.2	30.5	44.2	38.0	117.0	23.4	Calm.	Calm.	46	3	
11	29.907	59.0	33.3	46.2	40.5	111.8	24.2	Calm.	Calm.	61	1	
12	.710	52.1	37.3	47.1	43.2	92.0	30.6	S.	S.	203	10	.44
13	.192	53.6	47.0	49.4	47.8	81.7	45.8	S.	S.W.	291	10	.32
14	.298	56.6	43.3	49.0	43.0	112.8	38.6	S.W.	Calm.	254	3	.07
15	.520	55.3	38.4	46.0	41.0	107.8	38.8	Calm.	N.E.	154	9	.04
16	.738	50.1	30.8	41.8	37.4	105.7	22.7	Calm.	Calm.	158	7	.09
17	.444	54.8	41.8	47.9	44.7	93.1	40.9	S.W.	W.	194	9	.12
18	.898	56.2	42.3	47.9	39.3	119.6	37.4	N.W.	Calm.	229	3	.05
19	29.996	54.9	42.8	50.0	50.2	76.1	40.4	S.W.	S.W.	253	10	.01
20	30.170	60.5	45.3	51.4	44.1	114.9	34.4	N.W.	Calm.	261	4	
21	30.136	61.4	37.1	49.2	43.3	116.6	27.9	Calm.	Calm.	127	8	.43
22	29.599	56.9	47.9	50.4	47.0	100.6	41.8	Calm.	S.	193	5	.95
23	.313	57.2	47.2	50.9	45.8	112.6	42.0	S.W.	S.W.	294	9	.08
24	.540	55.2	42.0	47.3	42.3	110.7	38.3	N.W.	N.W.	188	6	.22
25	.370	46.1	35.5	41.7	40.6	73.9	30.7	Calm.	N.W.	145	10	.78
26	.504	53.7	32.3	43.9	39.4	111.1	27.5	N.	Calm.	133	9	
27	.731	51.3	36.0	44.4	37.8	106.5	28.8	Calm.	S.S.W.	98	3	.28
28	.340	52.6	42.0	46.3	40.5	105.8	36.0	W.	Calm.	285	5	.22
29	.383	51.4	38.0	42.9	36.1	92.0	30.6	Calm.	W.	318	7	.28
30	.748	53.1	33.9	44.1	36.8	117.7	27.7	W S W	S.	276	7	.57
Mns	29.788	55.1	39.3	46.7	41.4	104.2	33.7	...	...	5972	6.2	Sum 5.00

MAY, 1882.

Date.	Mean Readg of Baromtr. reduced to Sea Level.	Temperature.						Wind.			Mean amt. of Cloud (0-10).	Rain.
		In the Shade.				Highest insun's rays.	Lowst. on the grass.	Direction.		Velocity Miles.		
		High- est.	Lowest	Adop- ted. Mean.	Dew Point.			A.M.	P.M.			
1	in. 29.753	56.1	39.4	46.5	40.7	119.1	35.0	S.	S.W.	296	8	in. .03
2	.917	56.4	41.2	49.6	43.5	108.9	35.5	S.W.		209	7	.26
3	.770	63.7	44.3	51.8	47.4	115.2	38.3			140	6	.07
4	.736	60.4	45.2	51.2	46.7	116.9	39.0			50	10	.39
5	.888	63.0	44.9	52.2	47.5	117.7	37.9			48	9	.37
6	939	61.4	45.6	51.8	43.2	115.9	41.9			69	2	
7	29.989	63.0	39.3	50.6	43.2	119.7	33.5			64	3	
8	30.172	58.4	37.2	48.4	42.2	115.1	29.8	N.N.W		100	6	.02
9	.426	58.1	32.7	47.4	42.3	112.7	27.5	S.W.		84	10	
10	.384	64.5	48.6	55.6	51.4	111.7	47.8			116	10	
11	.270	67.2	51.9	57.2	51.4	124.0	46.9			99	5	
12	.293	63.1	49.2	53.7	45.0	116.8	42.0			88	5	
13	.343	65.3	40.2	53.6	43.8	117.7	31.0			90	0	
14	.330	58.3	40.0	47.6	38.5	116.6	34.6	E.	E.	207	2	
15	.300	53.3	37.9	45.4	37.0	115.9	30.8	E.		200	6	
16	.436	57.1	33.8	46.4	39.7	120.4	26.3	E.		175	.0	
17	.474	60.0	34.0	48.5	41.1	114.7	26.0			92	1	
18	.355	64.6	35.0	51.2	43.5	117.7	27.6			86	0	
19	30.102	60.6	38.3	51.2	44.0	117.8	29.8	S.E.		218	2	
20	29.862	61.4	41.4	52.3	44.2	116.7	34.8	E.	E.	251	0	
21	.891	67.4	45.4	55.3	50.3	117.7	38.9			168	7	
22	.793	66.6	45.4	55.7	49.0	123.8	36.3			131	6	.08
23	.521	66.4	46.6	56.6	50.6	112.7	36.3		S.W.	166	9	.61
24	.458	59.6	49.0	53.1	49.0	118.9	46.0	S.W.	S.S.W.	381	10	.33
25	.486	54.3	49.9	51.7	49.8	82.5	46.7	S.E.	S.W.	168	9	.44
26	29.822	60.1	50.3	54.4	50.4	107.9	46.3	S.W.	S.W.	309	10	.02
27	30.037	62.8	50.6	56.2	50.2	119.8	46.3	S.W.	S.W.	341	9	.02
28	.193	67.3	51.3	58.4	51.2	125.7	44.6	S.W.		162	8	
29	.342	68.1	44.4	56.6	48.4	130.7	38.0			49	1	
30	.322	67.1	45.4	57.5	45.0	124.7	36.9	N.E.	E.N.E.	86	9	
31	30.313	64.6	48.5	56.1	43.1	127.7	39.9	E.	E.	135	1	
Mns.	30.062	61.9	43.4	52.4	45.6	116.9	37.2	...	...	4778	5.5	Sum 2.59

JUNE, 1882.

Date.	Mean Readg of Baromtr. reduced to Sea Level.	Temperature.						Wind.				Mean amt. of Cloud (0-10)	Rain. in.
		In the Shade.				Highest insun's on the rays.	Lowst. on the grass.	Direction.		Veloc- ity. Miles.			
		High- est.	Lowest	Adop- ted Mean.	Dew Point.			A.M.	P.M.				
1	ins. 30.277	63.0	42.3	51.6	46.1	124.6	34.2	E.	E.	228	4.0		
2	30.056	58.7	48.4	54.5	48.8	84.2	44.0	E.S.E.		281	10.0		
3	29.804	63.1	53.0	57.5	53.5	88.8	51.1			28	10.0	.43	
4	.735	63.0	49.9	55.0	51.5	123.9	43.5	S.W.		200	7.0	.36	
5	.768	58.3	46.2	54.0	52.4	96.5	41.3	S.W.	S.S.W.	328	10.0	.72	
6	.694	63.3	53.2	56.7	51.7	120.8	51.8	S.W.		275	10.0	.01	
7	.820	63.2	47.1	55.0	49.9	122.7	38.9			125	3.5	.03	
8	.742	58.1	48.1	52.9	50.0	97.5	40.6		S.W.	127	10.0	.48	
9	.481	58.7	48.3	53.2	47.5	117.9	45.2	W S W	W.	185	8.5	.10	
10	29.781	62.2	48.8	54.2	47.3	123.8	44.7	N.		227	9.5	.17	
11	30.086	59.3	41.4	51.1	49.1	126.6	37.1	N N W	S.W.	163	9.5	.15	
12	29.889	58.1	43.4	49.3	42.7	121.7	37.9	W N W		168	4.0		
13	.947	55.2	37.1	48.4	43.9	107.1	32.1	N.W.	W.	173	10.0	.25	
14	29.857	59.3	50.3	53.7	48.0	112.8	46.9	W.		232	5.5		
15	30.028	60.8	46.8	52.0	43.0	115.7	40.0	W N W		188	5.5	.05	
16	.222	62.6	38.1	51.4	44.1	126.0	32.1	N.		88	4.0		
17	30.089	63.1	38.8	53.1	48.4	124.0	31.7	S.W.	S.	157	7.5	.40	
18	29.700	61.0	47.4	52.0	47.7	125.7	44.6	S.W.		160	9.5	.13	
19	.878	63.1	44.9	54.1	48.4	125.5	39.1	N.W.		146	7.0		
20	.928	65.4	48.3	55.5	47.9	114.7	44.4			81	7.0		
21	.867	63.2	46.3	55.7	53.8	105.2	39.8	S.W.	S.S.W.	210	10.0	.34	
22	.741	57.0	50.2	53.5	52.0	74.0	47.3	S.S.W.		134	10.0	1.25	
23	.899	61.6	43.4	52.3	48.1	123.7	36.8	S.S.W.	Calm.	158	5.0	.22	
24	29.934	63.9	49.1	55.8	50.7	123.7	44.7		S.S.E.	216	8.5	.23	
25	30.022	66.0	50.0	56.9	49.9	129.8	47.0			152	6.0		
26	.016	65.9	48.3	56.4	50.9	127.4	44.0	S.E.		105	8.0	.34	
27	.154	70.2	45.1	58.3	49.9	128.4	40.3	W.		84	6.5	.01	
28	.211	69.6	53.8	60.2	53.0	130.3	52.7			93	10.0	.01	
29	.150	68.5	54.9	61.4	56.3	117.1	52.2			37	9.5	.16	
30	30.180	65.2	54.9	59.3	56.0	115.2	51.3			55	5.5		
Mns	29.927	62.4	47.3	54.5	49.4	115.8	42.6	...	...	4804	7.7	Sum 5.84	

JULY, 1882.

Date.	Mean Readg. of Baromtr. reduced to Sea Level.	Temperature.						Wind.			Mean amt. of Cloud (0-10).	Rain.	
		In the Shade.				Highest insun's rays.	Lowst. on the grass.	Direction.		Velocity. Miles.			
		High- est.	Lowest	Adop- ted. Mean.	Dew Point.			A.M.	P.M.				
1	ins. 30-100	70°3	48°3	60°0	57°0	118°7	46°6				39	10·0	in. ·04
2	·120	70°2	55°1	62°6	57°9	120°6	51°9				32	4·5	·11
3	30-070	73°4	53°0	62°6	55°8	137°1	47°7				74	8·0	
4	29-736	59°6	54°3	57°0	53°2	94°7	52°4	S.W.	S.		185	10·0	·41
5	·542.	63°1	51°6	57°0	51°4	115°5	48°2		W S W		171	9·5	·11
6	·411	62°3	51°5	58°7	50°5	111°6	49°7	S.W.	S.W.		268	10·0	·61
7	·368	63°3	49°3	56°3	49°1	124°2	46°8	S.W.	S.W.		300	3·5	·05
8	·512	64°8	49°1	57°0	51°0	126°8	45°1		S.		198	6·5	·06
9	·665	65°0	49°3	56°8	51°2	126°7	43°9				124	5·5	·12
10	·758	64°6	46°4	56°4	50°8	125°2	40°8		S.S.W.		158	9·0	·37
11	·427	63°4	51°2	56°3	53°9	111°7	51°0	S.W.			95	10·0	·67
12	·912	68°9	50°5	59°1	52°4	125°7	50°0	N.W.			205	7·5	·07
13	·784	61°3	53°0	57°0	53°6	118°0	52°4	S.S.W.	S.S.W.		246	10·0	·20
14	·603	68°0	55°9	61°3	56°2	128°0	54°3	S.W.	S.		246	9·5	·34
15	·462	68°3	55°9	60°0	55°3	124°6	52°5	S.W.	S.W.		318	7·0	·03
16	·653	68°0	52°2	59°9	53°7	126°8	49°4	S.W.			209	8·5	·11
17	·803	65°0	52°8	58°6	54°0	126°1	49°3	S.W.	S.W.		194	9·5	·15
18	29-889	66°2	52°2	59°3	52°5	124°5	47°0	S.W.	S.W.		269	4·5	
19	30-073	68°1	50°9	58°9	51°2	130°7	45°4	S.W.			244	9·0	
20	30-171	67°3	49°1	58°3	51°3	124°8	42°9	S.W.			101	9·0	·03
21	29-961	66°6	50°6	58°4	54°4	128°5	47°1	S.S.W.	S.W.		240	9·5	·03
22	·807	66°9	53°0	57°5	52°5	119°5	51°1	S.			185	10·0	·09
23	·622	67°1	52°0	57°0	52°0	126°8	50°0	S.	S.W.		226	7·0	·04
24	·810	64°6	49°9	57°1	50°4	122°5	46°1	S.W.			162	4·5	·10
25	29-929	64°0	49°2	56°4	50°1	106°7	45°3				45	8·0	·02
26	30-363	66°9	48°9	57°6	52°0	122°2	44°0				83	5·5	
27	·428	70°0	44°4	59°3	53°4	128°1	39°9				70	5·0	·02
28	·329	70°7	54°2	60°9	56°8	128°7	52°2				44	5·5	
29	·212	72°2	51°6	60°9	57°9	128°4	48°7				23	7·0	
30	·163	71°8	52°0	61°7	53°8	129°7	46°7	W.	N.		87	4·0	
31	30-326	69°5	45°4	59°1	51°1	128°6	37°7	N.	S.W.		100	5·5	
Mns	29-871	66·8	51·1	58·6	53·1	123·0	47·6	...	...		4941	7·5	Sum 3·81

AUGUST, 1882.

Date.	Mean Readg. of Baromtr. reduced to Sea Level.	Temperature.						Wind.			Velocity. Miles.	Mean. amt. of Cloud (0-10).	Rain.
		In the Shade.				Highest insun's rays.	Lowest on the grass.	Direction.					
		High- est.	Lowest	Adop- ted Mean.	Dew Point.			A.M.	P.M.				
1	ins. 30-214	71°2	57°3	63°0	58°9	120°6	56°5			W.	121	10-0	in.
2	107	72°9	56°1	64°2	57°4	129°0	49°3	W.			156	1-0	
3	237	67°6	46°9	57°3	48°6	129°8	40°8	N.W.			105	5-0	
4	329	67°5	49°3	58°0	49°4	123°5	40°7	N.W.			142	4-5	
5	283	65°4	53°5	58°3	53°2	94°7	45°1	N.			103	5-0	
6	190	77°4	46°8	63°2	56°1	128°6	39°4	N.W.			98	1-5	
7	203	70°9	51°1	61°1	54°0	125°2	44°1				79	6-5	
8	213	71°3	50°1	59°8	54°0	131°3	45°4				39	3-5	
9	223	72°3	44°7	60°2	54°1	124°2	39°1				43	2-0	
10	280	61°1	52°5	56°3	52°4	81°8	48°7				83	10-0	
11	30-159	61°8	54°7	58°9	53°8	103°8	54°0				45	6-0	
12	29-942	78°7	47°0	63°1	58°8	134°6	41°4				71	5-0	02
13	813	70°1	59°5	63°6	59°1	115°5	55°4	S.W.			203	6-0	
14	830	70°1	58°5	63°5	57°4	127°6	55°2	S.W.			232	8-0	09
15	694	64°0	51°6	56°6	53°1	121°1					208	5-5	27
16	715	64°6	49°2	55°8	52°4	119°6					148	6-5	
17	885	66°6	48°1	58°7	53°8	107°1					66	6-0	
18	979	73°4	55°2	63°3	60°0	129°4	54°2				67	9-0	02
19	990	62°6	51°9	57°0	54°7	118°8	50°8				137	5-5	01
20	935	67°5	45°5	58°8	48°6	129°2	43°4		N.W.		124	7-0	06
21	812	63°5	52°2	56°6	48°2	115°2	48°9	N.W.	N.W.		202	2-5	
22	704	64°9	49°4	58°4	54°1	121°0	45°6	N.W.	S.W.		208	7-5	32
23	481	62°1	50°0	54°2	48°3	119°7	47°4	N.W.			294	8-5	08
24	634	58°7	47°2	53°4	50°2	113°5	44°8	W.			176	6-0	49
25	420	65°4	49°3	55°0	51°6	122°2	49°3	S.			158	7-5	34
26	687	64°1	51°0	56°9	51°5	118°5	49°6	N.W.			157	3-5	
27	814	62°3	49°1	56°0	47°3	114°4	46°4	N.W.			88	8-0	
28	710	62°6	43°0	53°7	47°3	103°7	41°1	S.W.			115	4-0	15
29	29-618	63°6	49°4	53°8	49°2	118°9	46°3				208	6-5	10
30	30-057	66°0	47°7	55°6	49°3	122°9	42°8	N.W.			131	3-5	
31	29-958	56°9	44°4	52°8	51°3	72°1	44°1				121	10-0	42
Mns.	29-989	66°7	50°4	58°3	52°8	117°3	...	...	...	...	4128	5-8	Sum 2-37

SEPTEMBER, 1882.

Date.	Mean Readg. of Baromtr. reduced to Sea Level.	Temperature.						Wind.				Mean amt. of Cloud (0-10).	Rain.
		In the Shade.				Highest insun's rays.	Lowst. on the grass.	Direction.		Velocity. Miles.			
		High- est.	Lowest	Adop- ted. Mean.	Dew Point.			A.M.	P.M.				
1	ins. 29.633	63.9	54.6	60.4	61.1	84.6	55.3	S.	S.	281	10.0	in. .72	
2	.550	66.1	56.5	60.2	55.8	123.6	55.2	S.W.	S.	358	9.0	.10	
3	29.837	66.5	54.3	59.2	54.1	123.5	53.8	S.W.		201	3.0	.01	
4	30.194	62.2	51.7	55.7	52.7	92.0	49.1			57	5.0	.02	
5	.199	58.8	44.3	53.3	53.5	90.1	42.4			75	10.0	.36	
6	.313	62.2	47.8	54.2	48.2	117.6	46.0		N.E.	97	1.0		
7	.395	64.2	43.2	53.3	49.4	121.3	41.1	N.E.		108	1.5		
8	.400	64.4	38.4	52.8	49.0	117.7	38.9			55	1.5		
9	30.305	63.9	39.2	52.1	49.0	120.8	39.6			60	2.5		
10	29.935	66.2	42.3	52.7	50.6	122.0	40.3			46	6.5	.01	
11	.720	64.2	47.8	54.0	48.5	119.4	43.5	N.W.		84	5.0		
12	.675	61.3	39.5	49.5	43.0	120.9	37.9			87	1.5		
13	.706	61.9	36.3	49.0	43.2	115.9	34.1			60	1.5		
14	.633	62.0	33.7	48.3	45.1	121.7	34.0			47	1.5		
15	.799	60.8	34.9	47.8	44.1	112.7	30.5			56	0.0		
16	29.963	66.3	35.4	50.5	45.1	114.7	32.7			33	0.0		
17	30.035	65.7	36.0	53.2	51.9	119.9	32.5			41	9.5		
18	30.049	60.2	40.3	50.7	45.7	111.8	31.7			88	0.0		
19	29.916	51.7	43.2	48.4	48.2	69.2	37.7	N.	N.	117	10.0	.85	
20	.770	61.0	51.3	55.2	52.5	121.7	50.8			144	10.0	.28	
21	.874	60.2	48.5	54.2	50.7	102.1	44.2	N.E.		98	8.5		
22	29.967	61.2	46.7	53.1	47.6	120.7	42.0	N.		88	7.0		
23	30.040	62.4	45.3	53.0	49.1	105.9	39.6			26	10.0		
24	29.982	60.1	51.3	55.2	51.2	82.0	48.4	S.W.		122	7.0		
25	.754	64.0	51.7	56.8	48.9	114.5	47.2	S.W.	E.S.E.	219	8.0		
26	.401	59.4	46.3	52.7	48.1	112.7	41.4	E.		143	5.5	.06	
27	.388	55.2	46.5	49.9	45.5	95.0	42.4		E.N.E.	93	8.0	.06	
28	.664	60.5	40.7	50.9	45.4	118.1	34.6	WS.W.	S.E.	89	5.5	.71	
29	.592	56.3	49.1	51.0	47.5	102.6	44.8	N.W.		166	6.5		
30	29.889	60.1	40.3	52.0	52.0	114.7	34.5		S.W.	144	10.0	.02	
Mns	29.886	61.8	44.6	53.0	49.2	110.3	41.5	...	...	3283	5.5	Sum 3.20	

OCTOBER, 1882.

Date.	Mean Readg of Baromtr. reduced to Sea Level.	Temperature.						Wind.			Mean. amt. of Cloud (0-10).	Rain.	
		In the Shade.					Highest insun's rays.	Lowest. on the grass.	Direction.				Velocity Miles.
		High- est.	Lowest	Adop- ted. Mean.	Dew Point.	A.M.			P.M.				
1	in. 29.826	66.0	53.8	58.6	54.6	91.9	53.0	S.	S.W.	311	10.0	.10	
2	30.037	63.3	47.0	55.3	51.3	121.2	40.2	S.S.W.	S.W.	204	3.0	.01	
3	.823	60.1	44.3	51.3	45.9	105.7	38.4	W.		111	2.0		
4	.516	59.8	42.4	52.7	50.2	96.8	36.9	W.N.W.	E.	86	9.5	.03	
5	.481	57.9	47.5	52.0	48.7	101.7	43.5		E.	163	7.5	.01	
6	.162	58.5	51.2	53.5	49.6	94.1	48.0	E.	E.	257	10.0	.12	
7	.072	60.1	40.8	53.7	49.8	113.9	49.7			126	9.0		
8	.111	58.0	44.3	50.3	48.6	108.6	38.3			56	8.5	.34	
9	.166	61.1	47.4	52.7	50.7	107.0	43.2			47	9.5		
10	30.007	57.9	46.8	53.1	52.3	76.7	46.5	E.	S.	58	10.0	.23	
11	29.596	59.0	50.6	54.2	51.8	78.9	47.0	S.		180	10.0	.14	
12	.588	59.1	38.8	46.8	43.9	117.0	37.4			25	1.5		
13	29.833	57.9	44.3	51.6	51.5	92.0	42.9			28	10.0	.01	
14	30.003	55.0	50.0	51.7	48.2	79.6	49.3	E.		78	10.0		
15	29.892	51.0	44.4	48.2	46.0	58.8	44.6		E.	91	10.0	1.15	
16	.616	51.0	43.0	45.7	43.3	58.0	44.0	E.	E.	235	10.0	.47	
17	29.919	46.1	43.0	44.7	43.6	53.1	44.1	N.N.E.		141	10.0	.03	
18	30.108	54.0	43.1	48.0	45.1	103.8	41.9		S.	90	8.5	.11	
19	29.782	53.0	49.7	51.3	49.8	59.2	46.0	S.		270	9.5	.16	
20	.812	56.3	39.8	48.8	47.5	104.6	34.8		S.	110	6.0	.54	
21	.483	55.3	47.1	52.2	51.4	93.5	41.7	S.W.		134	10.0	.35	
22	.359	54.8	40.8	46.2	43.3	107.6	35.0			174	5.5	.09	
23	.554	52.6	40.2	45.1	40.0	105.9	33.7	W.		120	1.0	1.14	
24	.208	48.1	33.8	41.7	41.6	67.0	32.2	S.E.		188	5.5	.69	
25	.583	51.0	34.1	39.8	36.4	98.8	26.9			47	5.0		
26	.492	50.9	28.3	39.6	38.6	102.6	22.8			74	7.0	.07	
27	.414	47.2	37.9	43.7	42.7	57.5	36.7	E.	E.N.E.	181	10.0	.50	
28	.611	47.5	45.3	46.0	42.6	52.7	42.5	N.E.	N.	226	10.0	.14	
29	.920	48.3	35.2	40.0	36.1	95.1	29.7	N.N.W.		191	4.0	.06	
30	.825	54.9	33.5	44.8	44.7	93.4	26.0	S.S.W.	W.	180	5.0	.23	
31	29.996	55.2	38.6	47.5	46.5	102.7	30.8		E.S.E.	78	5.5	.02	
Mns.	29.844	55.2	43.1	48.7	46.3	90.0	39.6	...	...	4260	7.5	Sum 6.74	

NOVEMBER, 1882.

Date.	Mean Readg. of Baromtr. reduced to Sea Level.	Temperature.						Wind.			Mean. amt. of Cloud (0-10).	Rain.
		In the Shade.				Highest insun's rays.	Lowest on the grass.	Direction.		Velocity. Miles.		
		High- est.	Lowest	Adop- ted Mean.	Dew Point.			A.M.	P.M.			
1	ins. 29.597	55.2	48.0	50.7	46.0	92.9	44.4	S.	S.W.	406	5.5	in.
2	.771	54.0	44.6	49.5	47.9	76.1	39.0	S.S.W.	S.	279	4.5	.15
3	.780	54.3	44.9	50.2	47.9	97.8	37.2	S.W.	S.W.	298	5.5	.17
4	.828	55.0	47.2	49.6	44.4	110.8	43.0	W.	W.	296	8.0	.07
5	.931	58.8	45.4	52.6	50.1	90.7	42.0	S.W.	W.	329	5.5	.07
6	.969	52.0	39.1	46.1	45.6	93.8	32.2		S.	85	8.0	.77
7	.716	48.7	40.7	44.1	41.2	72.0	40.2		W.	222	10.0	.30
8	.425	48.7	37.7	42.4	36.6	98.9	34.8		WSW	244	9.5	.17
9	.448	51.0	37.1	42.0	37.0	96.8	32.9			225	5.5	
10	.624	50.2	35.0	42.1	39.8	100.9	32.0	W.		124	5.0	.18
11	29.868	48.5	33.0	38.6	34.3	93.0	28.6			119	0.0	
12	30.066	41.1	27.3	34.0	31.7	82.1	24.5		E.	57	0.5	.04
13	29.997	42.2	35.0	38.1	34.4	72.9	31.6	E.	E.	266	8.5	
14	.993	38.0	32.2	34.9	30.8	52.8	28.2	N.E.	N.	276	5.0	
15	.653	45.0	29.9	36.3	31.5	87.8	26.0	N.	S.E.	123	5.0	.55
16	29.444	37.4	31.9	34.1	33.1	44.0	31.9	N.	N.	188	10.0	.17
17	30.004	37.2	26.8	30.9	28.4	52.9	24.9		Calm	111	5.0	
18	29.875	39.9	22.2	32.4	31.5	60.5	22.0		S.	100	9.5	.11
19	.521	47.7	35.1	39.6	34.5	90.2	30.8			179	2.5	.10
20	.425	45.1	33.8	38.4	35.0	85.0	29.9	W.	Calm	159	10.0	.04
21	.875	43.0	32.1	37.4	35.8	75.3	28.9	NNW	W.	95	5.0	.23
22	.615	51.0	39.9	47.6	46.3	68.0	38.6	W.	W.	249	10.0	.01
23	.463	53.2	49.4	51.2	50.2	58.1	47.4	WSW	S.W.	215	10.0	.29
24	.370	52.2	41.9	45.7	41.6	90.3	39.7	W	W.	196	7.0	.21
25	.328	44.6	37.6	40.6	38.2	68.7	32.8	Calm	N.W.	119	5.0	.11
26	.508	47.4	37.1	40.4	35.9	91.0	31.6		W,	186	2.0	
27	29.897	43.8	32.1	36.2	31.5	84.9	27.9			165	0.0	.05
28	30.143	43.9	31.1	36.4	32.8	87.2	27.3	N.W.		176	5.0	.29
29	29.833	47.3	34.0	40.9	38.8	88.0	31.6	WNW	W.	180	9.5	.11
30	30.142	42.5	29.3	34.8	32.3	76.5	27.8	N.		164	4.0	
Mna.	29.737	47.3	36.4	41.3	38.2	81.2	33.0	...	...	5831	6.0	Sum 4.80

DECEMBER, 1882.

Date.	Mean Readg of Baromtr. reduced to Sea Level.	Temperature.						Wind.			Mean amt. of Cloud (0-10)	Rain. in.	
		In the Shade.				Highest insun's rays.	Lowst. on the grass.	Direction.		Velocity. Miles.			
		High- est.	Lowest	Adop- ted Mean.	Dew Point.			A.M.	P.M.				
1	ins. 29.981	33.9	25.4	29.8	29.8	39.9	22.0				42	10.0	in.
2	.993	36.1	24.0	30.2	29.4	51.0	25.4		S.		91	10.0	.32
3	.845	50.1	34.8	44.3	43.8	64.0	33.3		S.		217	10.0	.19
4	.128	50.2	35.9	40.2	34.7	75.9	30.9				138	0.0	.02
5	.191	37.1	32.0	34.2	31.0	40.0	28.8	WN W	N.		178	8.5	.02
6	.217	34.7	29.9	31.4	26.8	46.7	30.1	N.			250	10.0	.03
7	.208	32.9	28.2	30.6	28.3	63.0	29.7	E.	N.E.		158	9.5	.51
8	.455	33.6	32.1	32.9	31.5	45.2	31.9	N.	NN W		263	10.0	.03
9	.747	38.3	24.3	30.0	27.5	76.7	25.4				78	5.0	
10	.799	28.7	16.2	19.9	17.3	54.1	20.1				7	10.0	
11	.784	24.7	11.8	16.6	15.1	46.0	15.9				5	10.0	
12	.653	30.7	16.2	26.4	25.7	43.0	20.4	E.S.E.	S.W.		136	10.0	.11
13	.568	40.1	30.2	36.1	35.8	52.1	30.7	S.S.E.			102	10.0	.03
14	.765	36.0	32.1	33.7	33.0	39.0	31.9				65	10.0	.01
15	.889	37.9	31.8	35.2	35.2	45.9	30.8				41	10.0	.02
16	.835	45.8	37.3	42.6	42.4	51.9	33.9	S.S.E.	S.		204	10.0	.20
17	.766	47.0	44.2	45.7	44.3	53.0	41.2	S.	S.S.E.		205	10.0	.12
18	29.649	48.4	43.3	45.8	43.1	55.0	41.7	S.S.E.	E.S.E.		299	10.0	.04
19	30.102	47.8	39.6	43.8	42.6	52.8	38.2				94	9.5	
20	30.248	48.2	42.0	45.1	42.2	51.7	36.1	S.	W.		149	5.5	.17
21	29.956	47.9	38.1	42.4	38.3	79.9	31.6	WNW			236	4.0	
22	.668	43.3	35.2	38.3	36.5	72.2	29.6				44	8.0	.08
23	.713	42.6	33.3	36.6	31.8	79.4	27.4		N.W.		173	4.0	
24	.888	41.0	31.5	35.5	32.9	72.8	26.9		S.W.		70	6.0	.18
25	.586	50.6	34.7	45.2	44.8	51.7	33.2		NN W		240	10.0	.66
26	.515	51.3	48.3	49.4	48.0	67.1	46.4	N.W.	S.S.W.		201	9.5	.20
27	.631	54.1	48.3	52.0	51.2	56.9	46.7	WN W	S.E		172	10.0	.23
28	.750	53.1	49.2	51.1	48.5	64.9	47.1	W.	S.W.		270	10.0	.03
29	.572	52.4	48.6	50.3	47.9	57.8	46.9	S.W.	W S W		339	8.0	.32
30	.730	53.3	45.9	49.6	48.4	63.4	43.0	S.			177	10.0	.28
31	.839	52.0	46.7	50.0	49.4	60.9	42.0				117	10.0	.26
Mns	29.683	42.7	34.6	38.5	36.7	57.2	32.9	...	...		4761	8.6	Sum 4.06

1882.

SUMMARY.

Month.	Mean Reading of the Barome. (reduced to Sea Level.)	Temperature.						Wind.										Amount of Cloud.	No. of Days it fell.	Rain. Amount Collected.					
		In the Shade.						Direction of	Proportion of	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.				Calm.	Velocity.			
		Highest.	Lowest.	Mean of all the Highest.	Mean of all the Lowest.	Adopted Mean.	Dew Point.																Mean of all the Highest in the Sun's rays.	Mean of all the Lowest on the Grass.	Degree of Humidity (Ratio=100).
ins.	51.4	24.4	44.3	34.9	39.2	36.9	59.1	31.0	91.2	0	0	1	3	8	0	1	41	40.46	7.6	11	1.67				
January	30.376	51.4	24.4	44.3	34.9	39.2	36.9	59.1	31.0	91.2	0	0	1	3	8	0	1	41	40.46	7.6	11	1.67			
February	30.242	55.0	25.3	47.0	36.0	40.8	38.0	76.4	30.5	92.0	0	0	4	4	9	6	7	5	21	44.39	8.0	9	2.35		
March	30.048	64.1	26.2	53.6	36.3	44.4	39.9	100.6	31.1	86.4	2	0	1	0	6	12	10	4	27	50.72	5.4	15	1.86		
April	29.788	61.4	30.5	55.1	39.3	46.7	41.4	104.2	33.7	84.6	1	5	8	1	6	9	3	5	22	59.72	6.2	19	5.09		
May	30.062	68.1	32.7	61.9	43.4	52.4	45.6	116.9	37.2	78.4	0	2	8	2	2	11	0	1	36	47.78	5.5	12	2.59		
June	29.927	70.2	37.1	62.4	47.3	54.5	49.4	115.8	42.6	83.6	2	0	3	2	3	11	5	4	30	48.04	7.7	21	5.84		
July	29.871	73.4	44.4	66.8	51.1	58.6	53.1	123.0	47.6	81.0	2	0	0	0	7	23	1	1	28	49.41	7.5	23	3.81		
August	29.989	78.7	43.0	66.7	50.4	58.3	52.8	117.3	46.2	88.5	1	0	0	1	4	31	42	41	28	5.8	13	2.37			
September	29.886	63.5	33.7	61.8	44.6	53.0	49.2	110.3	41.5	88.2	3	4	2	1	3	6	0	2	39	32.83	5.5	12	3.20		
October	29.844	66.0	28.3	55.2	43.1	48.7	46.3	90.0	39.6	93.7	2	21	1	7	4	4	1	30	42.60	7.5	25	6.74			
November	29.737	58.8	22.2	47.3	36.4	41.3	38.2	81.2	33.0	92.0	5	1	3	1	5	6	14	3	22	53.31	6.0	23	4.30		
December	29.633	54.1	11.8	42.7	34.6	38.5	36.7	57.2	32.9	95.6	4	1	2	4	9	5	4	4	29	47.61	8.6	23	4.06		
Year	29.950	78.7	11.8	55.4	41.9	48.0	44.0	96.0	37.2	87.9	22	15	43	19	66	105	51	42	367	...	6.8	206	43.79		

THE WEATHER, 1882.

JANUARY.

The weather of the month was most unusual, the *Barometer* was higher than had ever been known before, not only in January but in any part of the year. The highest reading was on the 18th, 30·983 inches, and the lowest 29·300ins. on the 3rd. The *Temperature* was, during the first half of the month, considerably above the mean; during the third week it was 3·5° below the mean, whilst during the last week it was only slightly below the mean. Even at its coldest, however, it presented a strange contrast to what was experienced last year. This colder half of the month was not felt as much as might have been expected in consequence of the small amount of *Rain*. After the 8th, there was practically no rain for the rest of the month. Heavy drizzle on the 29th produced from 0·1 to 0·2 inch of rain; and on two or three other days the condensed fog, for which the latter half of the month was remarkable, was a measurable quantity—but otherwise the last 3 weeks of the month were singularly dry. Of *snow* there was none except a very small quantity on the 13th. With the fog was an unusual amount of *cloud*, and a very small quantity of *sunshine*, in fact there were 20 days without the smallest quantity. The *wind* was also singularly small in amount. On one day, from 9 a.m. to 9 p.m. it had only passed over one mile, and frequently it was not moving at the rate of even 2 miles an hour.

FEBRUARY.

The month opened with cold weather, reaching its intensity about the 4th, after which it rapidly became warmer, so that, as a whole, it proved a mild month, but not unusually so, the frosts at night, though not severe, counterbalancing any extra heat during the day. The highest shade temperature was 55·0°, on the 14th, and on 7 other days the temperature rose to over 50°, whilst it was only 3 times below 40°. The minimum temperature, 4 feet above the ground, was 25·3°, on the 4th, on the ground 17·5° on the 2nd. There were 18 ground frosts during the month. The *Barometer* was, as a rule, high, reaching its maximum, 30·866 inches, on the 20th; after this date it fell rapidly during the rest of the month, being as low as 28·892 inches at 11 p.m. on the 28th. There were 7 sunless days, and only 4 really bright

sunny ones. Fog was prevalent during the first 10 days, at which time the wind was consequently very light. From the 9th to the 15th, and during the last 4 days of the month, the wind was fresh; in some places it was *very rough*.

MARCH.

Another remarkably fine month. The temperature, except towards the end, was invariably above the mean, and during the third week was as much as 7° above it. The maximum in the shade was 64.1° , only once exceeded, in 1871, when it was 67.7° ; but the mean maximum was 53.6° , decidedly the highest since 1865. The minimum temperature has been occasionally slightly exceeded in warmth, but yet the mean temperature of the month, 44.4° , is higher than that of any previous March. For the first 10 days the weather was not very remarkable, except for a very even temperature and a very great and steady rise in the barometer, but on the 12th a week of such singularly fine weather succeeded as has rarely, if ever, been experienced in March. The early mornings were very foggy, with thick hoar frost on the ground, but both were rapidly dispersed by the sun, which shone out from a perfectly cloudless sky. The amount of wind was very small; during the whole week it seldom moved at the rate of more than 2 miles an hour, and on the 18th it was absolutely calm for 12 hours. The cloudless sky naturally caused a considerable fall of temperature during the night, the difference between the day and night temperatures being at one time as much as 32° , but this did no harm to vegetation. There was no rain, but the heavy dew at night fully compensated for this dryness. From the 20th to the end of the month was a rather variable period. On the 21st snow covered the ground which was not melted till the next day, and about the 23rd was the coldest part of the month, the temperature on the ground falling as low as 17.7° . This caused some plants to flag, but no real harm was done to vegetation. A gale occurred on the 23rd, doing much damage in some places, not near Marlborough. With all this, March, 1882, must still be reckoned as among the finest ever experienced.

APRIL.

The Temperature of the month was slightly higher than the average of the previous 17 years; but this has been due rather to less cold than more heat than usual, only twice has the air temperature fallen below 32° , and even then but to a very slight amount, the minimum for the month being 30.5° . On the other hand the maximum temperature was only 61.4° , a very low

temperature compared with that of former years. The maximum temperature in the sun was only $119^{\circ}6'$, and the mean for the month $104^{\circ}2'$ both very low values for April, though on the other hand the heat has been remarkably uniform. There were 18 ground frosts, the severest being $22^{\circ}7'$, contrasting very favourably with that of the previous 17 years, when in 9 of them the minimum temperature was below 20° , and in one of them (1868) it sank to $9^{\circ}9'$.

Though the first 10 days of the month were very dry (in many places only a small amount being registered on the 1st), the subsequent days were almost invariably wet, so that the Rainfall for the month was excessive, being at least twice its average amount. The heaviest fall occurred generally on the 22nd, a second very heavy one occurred on the 25th. Towards the end of the month hail showers were not unfrequent, accompanied on the 28th with a thunderstorm. On the 29th a hurricane did more damage to buildings and trees than the October hurricane, but still several of the latter were blown down, whilst the damage to the fruit blossom and young foliage generally was very serious.

Vegetation progressed very rapidly except towards the end of the month, when the heavy rain and small amount of sunshine began to make the corn crops rather yellow, but no great damage was done.

MAY.

For the first 5 days the weather was very wet with variable winds. The barometer then rose very rapidly till the 8th, and kept remarkably high till the 18th. During this time not a drop of rain fell, and a drying east wind blew steadily. The first three of these days (9, 10, 11) were very dull, and the minimum temperature rose to an unusual height, being as high as $51^{\circ}9'$ on the 11th; an almost cloudless sky followed, and the proverbial "cold period" of May arrived. There were no frosts at a height of 4 feet above the ground, but on the ground there were eight, the most severe being 6° below freezing point, when potatoes and other tender plants were cut down. It must be observed, however, that during the previous 17 years, only twice (in 1875 and 1878) were we spared with so little frost as we were this year, not only in the number of frosts but also in their intensity. From the 18th to the 25th the barometer fell steadily; a thunderstorm occurred on the 23rd, when we had 3 very wet days with strong S.W. winds. After the 25th the barometer rose rapidly till the end of the month.

The maximum temperatures throughout the month were very uniform, only ranging from $53^{\circ}3'$ to $68^{\circ}1'$ —the minimum temperatures were, however,

very variable, but were higher than in any of the previous 17 years, except in 1865, 1868, 1876, and 1878. The mean temperature for the month was $2\cdot3^{\circ}$ above the mean of the previous 17 years. The sun shone brightly for 256 hours, slightly more than half the greatest possible maximum.

The gale in April greatly affected all trees then in leaf; consequently during May the horse chestnuts and oaks presented a miserable appearance on their sides exposed to the west. The latter were also so weakened that they were rendered especially liable to insect attacks. The east winds during the middle of May ruined all young fruit—the young apples and pears were almost entirely blighted off, and currant trees were in many places all but defoliated; where protected, however, and aided by sufficient moisture, vegetation was wonderfully luxuriant.

JUNE.

An unusually cold month, the cold being due, not so much from low night temperatures as from low day temperatures produced by a want of sun and excessive moisture. The highest maximum temperature was only $70\cdot2^{\circ}$, exceeded in every other year since 1865 except in 1879, when it was $69\cdot7^{\circ}$, only half a degree lower. The mean of the maxima was $62\cdot4^{\circ}$, colder than in any previous year, except 1871, when it was $61\cdot7^{\circ}$. The greatest heat in the sun was only $130\cdot3^{\circ}$, lower than in any previous year, except 1879, when it was $127\cdot9$; and considering that we have had temperatures of $163\cdot2^{\circ}$ (in 1874) and even $172\cdot0^{\circ}$ (in 1870), this is a very significant fact. No records exist for comparing the amount of bright sunshine with that in previous years, but as we had only about one third of what might have been expected, barely 159 hours in June, whereas we had 256 in May, this want of sunshine was very marked.

Turning now to the low night temperatures, the minimum in the air for the month was as high as $37\cdot1^{\circ}$, and nine times was it over 50° : on the ground the minimum was $31\cdot7^{\circ}$, the only time the temperature sank below freezing point; on 15 days the minimum temperature was over 40° and 5 times over 50° , in all these particulars contrasting very favourably with the minimum of former years.

The mean temperature for the month was $54\cdot5^{\circ}$ a temperature far below the average, and only exceeded in coldness three times, in 1869 ($52\cdot7^{\circ}$), in 1871 ($52\cdot2^{\circ}$), and in 1874 ($54\cdot3^{\circ}$).

The rainfall was very great, and more than twice the average, the fall on the 22nd was especially heavy.

JULY.

A very variable, damp, and cold month, most unfavourable for agricultural operations. The same remark, as regards *temperature*, which was made last month, will apply to this—the coldness arising from absence of great heat rather than intensity of cold. The *maximum* this year, for July, was only 73.4° , on the 3rd, a far lower maximum than we have ever had before. In fact I believe that nowhere in England did the thermometer rise to 80° during the month. The mean maximum was 66.8° , which is still the lowest on record (since 1865), though in 1871 it was only 66.9° . The *minimum* temperature was 44.4° , an unusual degree of warmth, as only in 1876 was there such a high minimum for the month, when it was 48.8° . The mean minimum temperature was only 51.1° , so far indicating rather a cold month. The lowest temperature on the ground was 37.7° and the mean 47.6° , both values high compared with those of former years except in 1874, 1876, and 1878.

The temperatures in the sun were singularly low, as might have been expected, the average being only 123.0° , though in 1866 it was 121.4° ; in 1875, 112.4° ; and 1877, 118.6° . There were only 186 hours of bright sunshine.

The rainfall was remarkable for the *number of days* on which it fell, rather than for the amount: heavy falls occurred on the 4th, 6th, and 11th, but otherwise the quantity registered was small, though the total for the month was rather above the average. Winds were often very light, and this added to a small amount of sunshine and a generally damp atmosphere, rendered the month very ungenial.

AUGUST.

The first eleven days were rainless, with a fair amount of sunshine, though the 1st, 5th, and 8th were very dull. The warmest day was the 12th, when the temperature in the shade rose to 78.7 , and in the sun to 134.6 ; but after [this rain fell almost every day, the result being that the mean temperature for the month was only 54.1 , thus proving it to have been the coldest August since 1865.

The mean *maximum* temperature was 66.7° : it was 66.6° in 1866, 66.7° in 1879, and 65.3° in 1881; and, with these exceptions, was the lowest yet recorded. The mean *minimum* temperature was, however, 50.4° , by no means the lowest; but the mean temperature for the month was only 54.1° , and this is by far the lowest on record. There were only 176 hours of bright sunshine—rather more than one-third of the greatest possible amount. The mean temperature of the

1st week was 0·3 above the average.

2nd " 0·4 above "

3rd " 1·7 below "

4th " 3·2 below "

SEPTEMBER.

Though the weather during the month, especially in the early part, was decidedly fine, yet the same want of heat, which has been noticed for some months past, has again been remarkable. The greatest heat in the shade was 66·5°, reached in coolness only once before; the mean maximum temperature was 61·8°; as the average for the previous 17 years was 64·7°, this indicates a cold period for the time of year.

The minimum temperature has been unusually low, especially during the middle of the month. The greatest cold in the shade was 33·7° on the 14th, but for a week before and after that date the temperature was very low, especially at night. On two occasions during this time there were ground-frosts, and several times the temperature on the ground fell to very nearly freezing point; but at other times it was high, so that, curiously enough, the mean temperature on the ground for the month was, if anything, rather high.

The mean temperature for the month was 53·0°, the coldest yet recorded, except in 1873, when it was 52·6°, and in 1877 when it was 52°. The mean temperature for the weeks ending Sept. 4th, 11th, 18th, and 25th were respectively 0·8, 3·6, 6·5, and 0·3 degrees below the mean of the previous 10 years; that for the week ending Oct. 2nd was 0·3° above the average.

The only other feature calling for special remark was the very small amount of wind. Not unfrequently it did not move at the rate of 4 miles an hour, and occasionally barely 1 mile an hour, during the day of 24 hours.

There were 141 hours of bright sunshine (119 in 1881); the highest temperature in the sun was 123·6°—an extremely low temperature for the time of year—only once (in 1866) was there so low a maximum temperature in the sun, when it was 119·3°. The last 10 days were, as a rule, very dull. There were 4 absolutely sunless days during the month.

OCTOBER.

The month opened fine and warm, with clear nights and very heavy dews. The mean temperature was high, though it gradually became colder as the month advanced. During the first 17 days the maximum temperature fell very steadily, whilst the minimum temperature remained pretty generally the same—consequently the daily range of temperature became unusually small: on

the 14th the difference between the maximum and minimum during the 24 hours was less than 5° , and on the 17th less than 3° . From the 10th to the 17th there was an extremely small amount of sunshine (only a little over 7 hours), and the warmest part of the day was occasionally at 9 p.m. Thus the maximum temperature for the 14th was entered as $55^{\circ}0'$; this was the temperature at 9 p.m. on the 13th, the temperature on the 14th at 9 a.m. being $51^{\circ}8'$, and apparently not having risen subsequently during the day. The maximum temperature again for the 15th was $51^{\circ}0'$, which was the temperature at 9 p.m.; and for the next two days it never rose above that point, so that though the maximum temperature of the 16th is considered as $51^{\circ}0'$, (being the temperature when the instruments were set on the evening of the 15th,) yet the temperature during the day never exceeded $46^{\circ}7'$.

During the last 14 days of the month, the maximum fairly maintained its level, whilst the minimum fell very considerably till the 23th. From the 24th to the 26th was a decidedly cold period, with sharp ground frosts, which cut down all tender garden plants. The daily range of temperature on the 19th was only $3^{\circ}0'$, and on the 28th only $2^{\circ}2'$, a most remarkably small amount. The 24th was such an extraordinary day as to deserve a more detailed description. At 9 p.m. on the 23rd the weather was decidedly fine, with a rising barometer and scarcely any cloud. By 6 a.m. on the 24th it was raining heavily, and the barometer falling very rapidly. From 6—9 a.m. it was still very wet, with thunder and lightning at intervals, and the wind easterly. At 9 a.m. there was a lull for a few minutes, when the wind suddenly veered round to the south and torrents of rain fell. At this time the temperature was very extraordinary. The wet and dry bulb thermometers, the maximum and minimum, the black bulb and bright bulb solar radiation, all registered 45° within a very few tenths of a degree of one another, and the thermometer 6 inches under ground also registered very nearly the same temperature. The barometer still kept falling till at 9.20 a.m. it reached its lowest (28.882 ins.), having fallen at least 0.7 inch in the previous 12 hours; it then began to rise fast, but at 11 a.m. hail fell, succeeded shortly afterwards by snow for about an hour. The wind continued to increase in violence, and reached its height at noon; little or no damage appears to have been done, but its violence may be estimated from the fact that a sheet of lead which had been laid over a Dormer window in a building (but not fastened down) was blown completely over to one side. By 3 p.m. the weather was very steadily improving, and at 9 p.m. it was very bright and calm. At 10 p.m. the Kennett, which had been swollen by the floods nearer its source, rose very rapidly (about 5 feet in half-an-hour), and much damage was done to all low-lying districts.

The barometer was very variable throughout the month, the range being over 1.5 inches. The maximum temperature in the shade was $66^{\circ}0'$, and the

mean of the maximum 55·2°. This, though rather high, is not unusually so; it has been exceeded 6 times in the previous 16 years. The minimum temperature in the shade was 28·3°, the only time it fell below freezing point. The mean minimum was 43·1°, a decidedly high amount, only exceeded 4 times before. The mean temperature of the month was 48·7°, also high; it was exceeded in 1865 (49·5°), in 1866 and 1874 (50·3°), in 1876 (51·8°), and in 1878 (50·1°). The mean maximum in the sun was 90°, about its proper amount, though it was under 60° no less than five times. The mean minimum on grass was 39·6°, an extremely high temperature, only once before exceeded in 1876, when it was 41·7°. There were five ground frosts, the most severe being 22·8° on the 26th. There were only 73 hours of bright sunshine during the month whereas we had nearly 133 in 1881, the amount of cloud was consequently very great. Except for the few days at the beginning and end of the month (when it was westerly) the wind was generally easterly, and frequently very slight; on the 8th, 9th, and 10th, it went at the rate of barely two miles an hour, and on the 11th and 12th only one mile an hour during the day of 24 hours. The rainfall was great, nearly double its average amount, though it was exceeded by the fall in 1865 of 7·25, and in 1875 of 7·64 inches; but the number of wet days has never been exceeded in any previous October. In 1875 three times was there a fall of over one inch, and in 1865, 1872, and 1880 once, but this year twice.

NOVEMBER.

The barometer was, throughout the month, unusually variable, rising and falling with great rapidity, though the extreme variation was under 1 inch. The weather was therefore, as might have been expected, very unsettled and damp, and bad for farming operations. The temperature in the shade was was not at all remarkable, though perhaps warm on the whole: it was coldest about the middle of the Month, but not sufficiently so to deserve special mention. The temperature in the sun was high, its mean being higher than has yet been recorded here for the month of November, and the sun shone brightly for nearly 88 hours, a pleasing contrast to last year, when it shone only for 62 hours.

The Rainfall was rather above the average, but the individual falls were generally small. The ground was kept in a damp sodden state, especially as the wind was generally light, sometimes moving only 2 miles in 12 hours, though its average rate was from 7 to 9 miles an hour. The snow on the 16th was about 4½ inches deep, and lasted a few days. On the 17th a fine Aurora Borealis was seen generally over England.

Maximum in shade 58.2° (on the 5th). Mean of Maximum 47.2° . Minimum in shade 22.2° (on 18th). Mean of minimum 36.4° . Highest in the sun 110.8° (on the 4th). Mean of solar temp., 81.2° . Lowest on grass 22.0° (on 18th). Mean of grass temp., 33.0° . Mean temperature of month, 41.3° .

There were 7 frosts at a height of 4 feet above the ground and 17 on the ground.

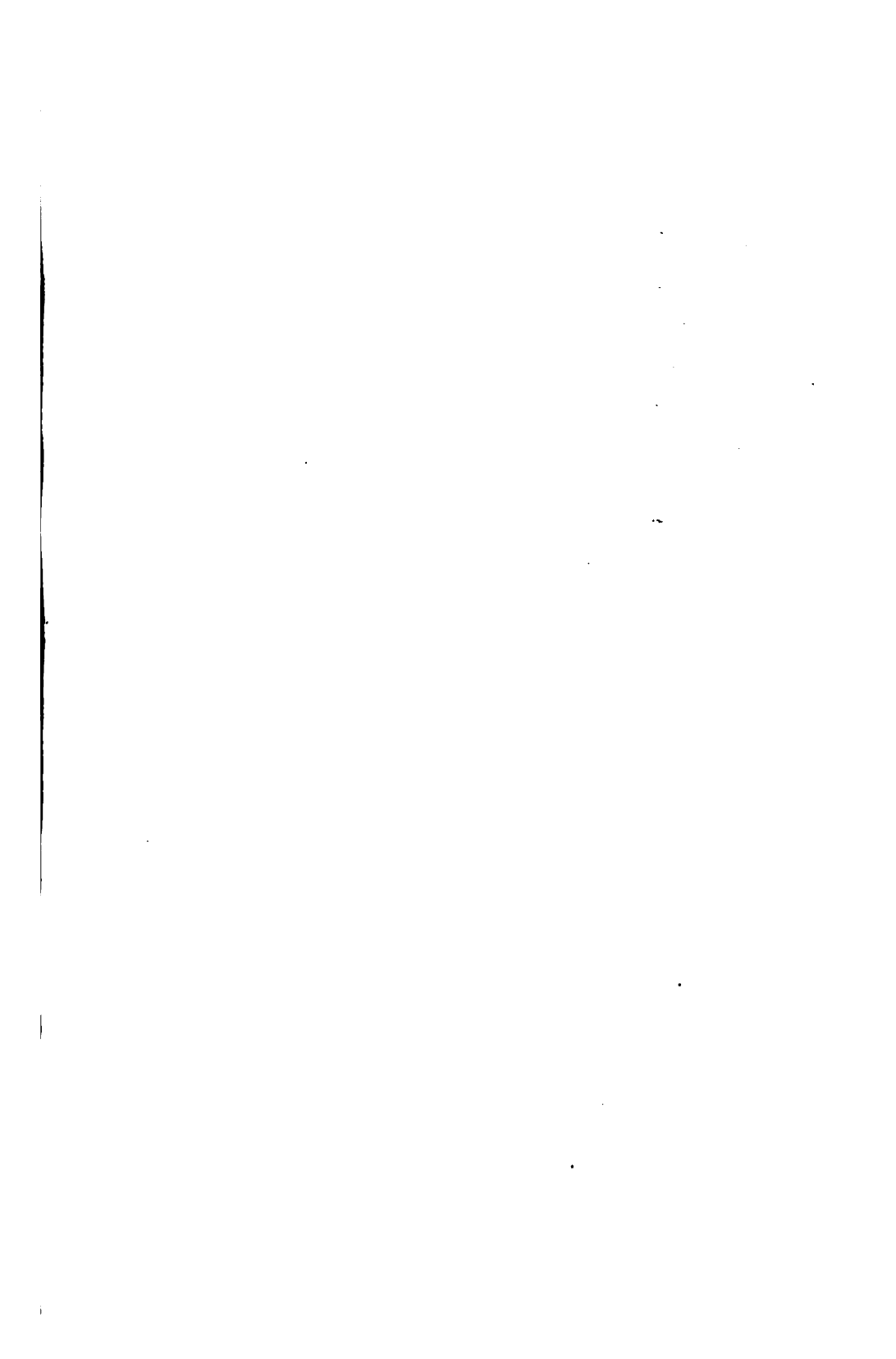
DECEMBER.

The weather was very remarkable. During the first half of the month (with the exception of the 3rd and 4th), it was far colder, whilst in the second half it was far warmer than any corresponding periods yet recorded here. On the 6th, 7th, and 8th, snow fell, and for the next three days the temperature kept falling till the minimum air temperature was as low as 11.8° , and the maximum air temperature only 24.7° . This was the coldest part of the month. After this the temperature rose slowly, but the melting snow caused thick fogs and dull skies, and kept the temperature only a little above freezing point till the 16th. From this period the temperature rose rapidly and (except on the 24th) was never below 32° . The range of max. and min. temperatures has therefore been extraordinary, and yet the difference between the means singularly small.

Highest max., 54.1° ; lowest max., 24.7° ; mean max., 42.7° ; Highest min., 49.2° ; lowest min., 11.8° ; mean min., 34.6° . As regards the max. temperature it was 9 times above 50 and 3 times below 32° . In former years, 1866 it was 11 times, in 1868 18 times, in 1876 11 times, and in 1890 13 times above 50° , but in none of these years was it below 32° ; on the other hand, in 1870 it was 11 times below 32° and only three times above 50° , and in 1874 and 1878 it was five times below 32° and only twice above 50° , so that the temperature of the past December was most exceptional. The min. temperature was 3 times below 20° , but it is only in 1874 and 1879 that we find a colder December; in the former the min. was 7 times and in the latter 5 times below 20° . The mean temperature for the month was 38.5° —as nearly as possible the average of the mean temperatures of all the previous Decembers.

The amount of sunshine was very small—only about 23 hours as against $50\frac{1}{2}$ last year; in fact the average amount was only $\frac{1}{2}$ -hour daily; there were 17 absolutely sunless days.

Wind was very variable, generally easterly up to the 20th, and westerly afterwards. On the 10th and 11th, it moved only 12 miles in 48 hours but towards the end of the month it was strong at times. Underground temperatures rose considerably, and this tended to hasten on vegetation: reports of early flowers were consequently not unfrequent.



BOYS WEIGHED MARCH, 1875, 1877, 1879, 1881, 1882.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
433	Lawford, H.B. ...	vi	17-10	67-5 1-1	142-2 13-2				
554	Robinson, F.S. ...	vi	19-5	67-0 0-8	136-0 5-8				
460*	Buckland, A.V. ...	M.U. 1	18-4	70-5 11-2	155-0 60-2	32-0 4-3	22-0 0-5	14-0 2-3	9-6 0-9
75	Highton, H.P. ...	L. v 2	16-6	67-8 4-9	134-8 32-0	31-6 3-0	21-9 0-4	13-2 1-3	9-3 0-6

* Six years' increase.

BOYS WEIGHED MARCH, 1877, 1879, 1881, 1882.

150	Bacon, J.S.F.	vi	16-0	66-0 1-5	137-5 15-5				
53	Cardew, E.K.	vi	19-3	67-0 0-6	134-3 9-8				
109	Clayton, A.G.	M. U. 1	17-5	69-7 2-9	144-5 17-5				
28	Hobhouse, L.T. ...	vi	17-5	68-5 2-7	135-0 14-0				
196	Jacob, J.L.	L. v 2	16-11	66-7 2-2	135-0 12-8				
54	Wood, H.E.	vi	17-3	68-9 0-8	140-0 12-0				

BOYS WEIGHED MARCH, 1875, 1877, 1879, 1881, 1882.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
463	Lawford, H.B. ...	vi	17-10	67-5 1-1	142-2 12-2				
524	Robinson, F.S. ...	vi	19-5	67-0 0-8	136-0 5-8				

BOYS WEIGHED MARCH, 1876, 1878, 1880, 1881, 1882.

460*	Buckland, A.V. ...	M.U. 1	18-4	70-5 11-2	155-0 60-2	32-0 4-3	22-0 0-5	14-0 2-3	9-6 0-9
76	Highton, H.P. ...	L. v 2	16-6	67-8 4-9	134-3 32-0	31-6 3-0	21-9 0-4	13-2 1-3	9-3 0-6

* Six years' increase.

BOYS WEIGHED MARCH, 1877, 1879, 1881, 1882.

159	Bacon, J.S.F.	vi	16-0	66-0 1-6	137-5 15-5				
53	Cardew, R.E.	vi	19-3	67-0 0-6	134-3 9-8				
109	Clayton, A.G.	M. U. 1	17-5	69-7 2-9	144-5 17-5				
28	Hobhouse, L.T. ...	vi	17-5	68-5 2-7	135-0 14-0				
195	Jacob, J.L.	L. v 2	16-11	66-7 2-2	135-0 12-8				
54	Wood, H.E.	vi	17-2	68-9 0-8	140-0 12-0				

BOYS WEIGHED MARCH, 1878, 1880, 1881, 1882.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
550*	Bent, E.H.....	M. M. 2	16-0	65-1 9-9	128-0 50-0	31-0 4-5	20-8 0-6	12-3 2-1	9-6 2-6
382	Berkeley, G.A.H.G. M. iv (b)		16-4	63-7 5-1	105-0 22-5	27-2 0-5	20-3 0-2	12-0 1-0	7-8 0-3
310	Blandford, W.F.H. vi		17-2	70-8 2-8	165-0 31-0	33-6 2-6	22-5 —	15-6 1-5	10-2 1-3
553	Buckland, E.H.....	Up. v	17-8	67-7 3-7	138-3 26-3	32-0 1-5	21-5 0-3	13-1 1-1	9-5 0-4
81	Chambers, E.K....	M. v	15-11	67-6 6-1	139-0 42-2	29-7 3-0	21-2 0-2	13-9 2-2	9-2 1-0
435	DeChair, F.B.C. vi		17-0	69-8 2-3	175-5 25-0	34-5 2-0	22-2 0-2	14-5 0-9	10-4 1-0
398	Duncan, S.....	L. v1	16-9	65-5 2-3	128-8 21-0	32-5 1-1	21-6 0-3	12-5 0-6	9-9 1-0
344	Ellam, E.S.	L. v1	15-11	65-6 4-6	130-0 27-5	29-5 2-0	21-1 0-8	13-0 0-5	9-6 1-0
175	Everett, E.H.....	L. v1	17-7	67-6 0-8	165-5 18-5	32-2 1-8	22-0 0-5	13-5 0-5	9-6 0-4
272	Gabbett, E.	M. U. 2	17-0	62-4 5-0	119-0 23-7	30-0 2-5	22-7 0-1	13-0 1-1	9-8 1-3
558	Garnett, G.R.....	M. U.1	16-9	67-9 4-8	140-0 31-0	31-5 3-0	21-5 0-4	13-3 0-8	9-3 0-8
56	Harvey, R.C.M....	vi	17-5	69-7 1-7	160-8 21-3	32-7 2-7	23-2 0-2	14-5 0-9	10-0 0-5
57	Harvey, J.M.	Up. v	16-2	63-2 6-1	119-8 33-3	29-5 2-6	21-1 0-1	13-0 1-9	9-0 1-2
393	Hemaley, W.J. ...	vi	17-4	69-7 5-7	151-0 36-0	31-0 1-0	21-9 0-5	13-5 1-5	9-5 1-1
347	Hockin, H.V.	Up. v	18-0	69-4 2-4	142-0 21-0	32-9 3-5	21-6 0-1	13-0 1-0	9-6 1-0
290	Jones, R.D.....	vi	18-1	69-3 1-4	134-5 8-3	33-2 0-5	21-6 0-1	12-2 0-7	10-1 0-7
287	Leaf, C.H.	L. v. 1	18-0	63-4 3-3	130-0 23-7	30-5 1-5	22-3 0-1	13-3 1-1	10-2 1-2
192	Mullens, G.R. ...	Up. v	17-10	68-3 4-8	143-0 34-5	30-0 2-0	22-7 0-2	13-2 1-2	9-7 1-6
46	Rowe, F.E.....	vi	17-3	66-3 0-5	152-5 28-7	33-5 1-0	22-5 0-1	13-8 0-8	11-0 1-0
526	Smith, H.E.	Up. Sh. (a)	16-2	63-5 5-2	112-0 18-0	30-5 1-3	22-2 0-2	11-6 0-5	8-4 0-4
448*	Smith-Marriott, W. Up. Sh. (a)		16-6	66-2 9-9	128-0 49-2	29-7 3-7	21-8 0-8	13-5 2-0	9-8 2-3
517	Vaughan-Johnson, H. Up. Sh. (a)		16-9	69-5 2-7	166-5 43-7	32-0 1-5	22-5 0-6	14-8 1-1	10-3 1-1
184	Watson, A.H.....	M. v	17-9	68-6 4-1	139-5 27-7	30-8 1-3	21-7 0-1	13-8 0-8	9-5 1-0
464	Williams, S.G. ...	Up. v	17-7	69-0 3-2	157-5 39-5	32-3 0-6	21-7 —	14-1 0-4	10-0 0-6

* Four years' increase.

BOYS WEIGHED MARCH, 1879, 1881, 1882.

No.	Name.	Form.	Age. Years.	Height. in. ins.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
506	Arnold, W.R.....	M. U. 2	16-6	66-5 —	146-0 1-0				
578	Askwith, H.F. ...	M. v	16-2	66-0 3-3.	131-0 19-0				
369	Berwick, H.C. ...	M. L. 1	16-9	67-5 2-0	132-8 18-3				
361	Bett, H.C.	Up. iv (b)	14-9	66-3 3-2	128-0 19-0				
214	Blackall, H.O. ...	M. U. 1	16-11	69-1 1-2	149-8 6-3				
35	Buchanan, T.G....	L. v 1	16-0	65-7 2-4	130-0 14-5				
215	Carpenter, E.C....	M. M. 2	16-0	63-6 3-2	127-5 20-0				
490	Cheales, J.P.	L. v 1	16-3	63-9 1-0	137-5 7-5				
304	Chopmell, C.H. ...	Up. v	17-9	66-0 1-9	136-0 9-5				
23	Daltrey, B.H.R. ...	vi	16-11	70-5 0-6	155-0 3-5				
283	Davis, H.J.	Up. iv (b)	14-10	67-0 9-0	142-8 44-8*				
22	Dupuis, C.E.	M. v	17-5	61-6 2-6	115-0 28-0				
275	Ellershaw, E.....	Up. Sh. (b)	14-3	61-4 3-0	110-5 10-5				
24	Grace, G.H.	Up. iv (b)	15-2	64-6 3-1	119-0 15-0				
252	Hamilton, J.Z.M.	L. v 2	17-1	64-0 0-7	132-0 10-0				
32	Hardy, W.E.	L. v 2	16-0	63-5 2-5	121-0 10-0				
61	Hartley, C.....	M. v	17-0	66-2 1-7	138-0 11-5				
571	Keeling, H.T.....	M. M. 1	16-10	69-1 1-3	164-0 11-0				
190	Lawrence, P.J. ...	M. L. 2	15-0	63-5 3-1	124-0 21-8				
362	Mahon, G.	Up. Sh. (b)	16-4	64-7 1-3	140-0 19-0				
148	Maurice, G.T.K.	M. M. 2	14-11	66-7 1-8	120-0 11-5				
5	Parr, T.H.	vi	17-3	66-0 3-5	128-3 17-3				

* Three years' increase.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
330	Paul, E.M.	L. v 1	17-6	63-2 2-2	108-8 9-8				
2	Poynton, A.B. ...	vi	14-8	59-6 2-7	97-0 11-6				
150	Prescott, H.M. ...	Up. Sh. b	15-11	67-9 2-6	131-3 16-3				
66	Purcell, A.H.D'O.	L. v 1	16-6	68-0 3-0	133-5 9-0				
303	Sim, G.A.C.	Up. v	16-6	69-3 3-3	154-0 18-0				
193	Vassall, H.G.	M. v	17-1	68-1 2-2	155-0 21-3				

BOYS WEIGHED MARCH, 1880, 1881, 1882.

165	Adams, A.	Up. Sh. (a)	16-5	63-6 3-7	113-0 26-5	28-4 1-9	21-1 0-6	12-3 1-4	8-8 0-9
6	Alington, H.T.G.	Up. v	15-10.	62-7 5-4	123-8 28-8	29-5 1-2	21-1 0-1	13-0 0-9	9-1 0-5
404	Anderson, C.M....	Up. Sh. (b)	15-4	62-0 3-5	100-0 16-5	27-0 —	21-5 —	12-5 0-9	7-7 0-6
387	Atlay, G.W.	M. iv (a)	13-9	57-5 2-8	98-5 8-5	28-5 0-5	20-4 -0-1	11-2 —	7-3 -0-3
198	Banks, V.A.	L. Sh.	13-7	60-9 3-8	100-0 13-0	27-0 0-8	22-0 0-1	11-8 0-6	7-8 0-1
392	Bliss, F.H.	Up. iii	13-6	57-3 3-0	80-5 14-0	25-0 1-0	21-5 0-5	11-0 1-0	7-2 0-2
131	Browne, L.W.	Up. iv (b)	13-6	58-8 2-8	100-0 9-5	27-5 0-8	21-5 -0-1	12-0 0-4	8-3 0-3
96	Brownjohn, A.D.	Up. Sh. (a)	15-6	67-2 5-9	130-0 26-5	31-5 3-5	22-0 0-1	13-1 1-1	8-6 0-7
49	Bullock, L.C.W....	Up. v	15-6	63-8 3-9	111-0 23-0	28-5 1-5	21-3 0-2	13-7 2-2	8-6 1-0
391	Butler, E.G.	L. iv	15-2	60-4 1-9	108-5 9-5	28-3 -0-4	21-5 0-3	12-0 —	8-4 —
155	Carwardine, H.T.	L. iv	14-9	57-0	92-0	27-5	20-7	11-5	8-7
397	Chataway, W.P....	Up. 4 (a)	16-7	65-3 4-5	139-5 30-5	32-8 4-1	21-8 0-2	13-1 1-1	8-1 -0-3
93	Cholmeley, W.F.	Up. 4 (a)	15-4	61-2 5-1	110-0 26-5	30-0 4-0	21-2 —	12-2 1-8	9-0 1-3
103	Clark, H.A.	L. v 2	16-3	62-0 3-5	105-5 20-0	27-5 1-1	21-2 0-2	12-5 0-8	8-0 0-3
520	Clarke, L.J.	Up. Sh. (a)	16-5	61-7 5-4	112-0 12-5	28-9 2-9	21-3 0-7	12-2 1-2	8-8 0-9

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
227	Drummond-Hay, F.E.L. Sh.		13-6	59-8 3-0	95-0 13-7	25-8 -0-2	21-3 0-1	12-6 1-7	8-0 0-5
110	Eardley-Wilmot, E. M. U. 2		13-5	61-7 3-6	95-0 14-5	27-5 1-0	21-0 —	11-0 0-8	7-9 0-8
197	Elton, H.G.	Up. Sh. (a)	17-2	66-8 3-3	141-5 16-0	30-5 1-5	23-0 0-6	13-0 0-4	9-7 -0-4
594	Everett, D.	M. iv (a)	15-7	62-5 4-5	106-8 22-8	29-0 2-5	21-9 0-2	11-8 1-1	8-2 1-0
380	Filgate, E.P.J.F.M. M. U. 1		16-11	69-0 6-0	148-5 37-7	32-5 2-5	21-8 0-2	13-7 0-8	10-7 2-2
92	Foyster, H.C.B.	L. v 2	15-11	59-5 3-0	95-5 9-5	28-0 2-0	21-0 —	11-8 0-7	7-7 0-5
284	Horton-Smith, P. Up. Sh. (a)		14-2	57-0 2-9	90-0 -1-8	25-8 0-3	21-5 0-3	11-0 0-3	7-8 0-2
592	Hulbert, J.	Up. Sh. (b)	15-5	66-7 5-8	121-0 20-7	28-6 2-6	22-4 0-3	13-0 1-1	8-1 0-1
217	Hume, A.S.V. ...	M. U. 2	16-7	67-5 1-9	167-5 39-5	32-8 1-8	22-5 0-1	14-0 0-5	9-5 0-4
211	Isacke, R.H.	L. v 2	15-7	56-7 2-7	82-0 8-5	27-0 0-6	21-1 0-7	10-6 0-6	6-8 -0-1
224	Jackson, A.L.	M. L. 2	13-11	63-2 4-1	114-5 15-0	29-0 1-0	20-5 —	12-6 0-9	7-7 -0-2
328	Kaye, C.W.	L. v 2	16-8	68-5 4-4	132-5 25-0	30-0 2-1	21-6 0-1	12-7 0-8	8-5 0-5
379	Lane, R.O.B.	L. iv	13-5	62-1 4-0	105-0 15-0	28-0 0-5	21-3 -0-2	11-7 1-0	8-0 —
64	Little, J.F.W.	Up. v	15-10	57-8 4-8	104-5 22-0	27-5 0-6	20-6 0-5	12-7 1-6	8-7 0-5
280	Mangles, A.E.R. M. L. 2		14-9	61-7 3-6	113-8 19-8	28-5 0-6	20-9 0-4	12-7 1-1	8-6 0-4
591	Marshall, R.H. ...	M. L. 1	16-2	61-5 1-9	100-5 10-0	26-0 —	21-2 0-1	12-0 0-5	7-7 -0-2
160	Meyrick, L.O. ...	L. v. 2	15-3	61-3 3-2	99-0 9-5	25-8 -0-1	21-7 0-1	11-7 -0-2	8-2 0-2
593	Molony, E.A.	M. v	16-1	60-2 2-7	101-0 13-0	27-0 —	21-5 0-1	11-9 0-7	8-2 0-5
527	North, M.K.	M. M. 2	16-3	63-0 3-1	118-0 23-0	28-5 1-0	21-5 0-6	12-1 0-9	8-6 0-4
565	Penlington, E.T. L. v 1		16-4	61-8 4-0	108-0 14-5	27-8 -0-7	21-0 -0-4	11-9 0-9	7-4 0-4
69	Roberts, A.W. ...	Up. Sh. (b)	14-6	66-9 5-2	137-0 27-5	31-8 4-3	22-0 0-5	13-7 0-7	8-6 0-4
251	Robins, H.H.	M. L. 2	14-8	59-9 4-3	123-5 36-5	27-8 0-6	21-0 1-0	12-0 —	7-9 -0-1
152	Ross, A.J.C.	Up. iii	14-6	63-1 3-6	127-5 23-0	29-6 1-1	21-9 0-4	13-8 1-3	8-6 0-6
486	Roupell, G.S.	M. U. 1	16-0	69-5 5-2	134-8 30-3	30-0 2-3	21-2 0-2	13-5 1-6	9-2 1-2

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
77	Sharp, A.J.	Up. Sh. (b)	14.2	58.1 3.2	90.8 13.8	25.5 0.3	21.0 0.4	12.0 1.1	7.6 0.2
286	Sidgwick, C.T. ...	L. 3	13.11	60.0 2.8	90.8 10.8	26.5 1.0	21.0 —	11.1 0.2	7.3 0.2
405	Waddilove, R.A.W.	M. L. 2	14.9	61.3 3.0	86.8 10.3	25.7 0.1	20.4 0.4	11.2 0.5	7.1 0.2
442	Williams, A.P.W.	M. L. 1.	15.1	65.2 5.4	135.0 33.5	30.0 2.5	21.0 0.3	13.0 1.5	9.5 1.0
446	Wise, P.F.	M. M. 2.	15.4	62.7 1.7	98.5 9.7	25.7 0.2	23.9 0.2	11.8 0.3	7.1 0.1
473	Worship, H.L. ...	M. L. 2.	14.5	56.0 2.2	77.8 9.8	25.9 1.2	20.0 -0.4	10.4 -0.1	7.0 —
441	Wright, J.J.	M. L. 2.	14.9	60.3 4.0	101.0 12.2	27.0 -0.9	21.6 —	12.9 1.8	8.4 0.2

BOYS WEIGHED IN MARCH, 1881—1882.

163	Annesley, A.D. ...	Up Sh. (a)	15.4	63.8 2.6	108.3 14.8				
237	Blundell, G.E. ...	Up. iv (a)	14.6	66.6 7.8	92.5 5.5				
99	Brown, S.R.	M. v	14.7	63.0 2.5	110.3 8.8				
352	Clark, H.E.	M. M. 2	14.7	69.0 2.0	145.0 15.0				
14	Clark, S.H.	L. v 1	14.7	57.5 1.7	83.8 9.3				
468	Coats, W.H.	M. L. 1	15.11	60.5 2.0	95.0 13.5				
470	Coats, P.M.	M. L. 1	15.11	60.5 2.0	94.5 11.5				
453	Crookenden, G.P.	M. iv (a)	13.10	60.0 1.5	101.5 9.7				
245	Dean, J.E.	L. Sh.	11.6	55.7 1.4	87.8 6.3				
166	Dobbs, C.R.	Up. Sh. (a)	13.2	59.3 0.8	95.5 5.0				
307	Drake, E.C.	L. iv	14.5	60.7 0.7	113.5 7.5				
232	Ferguson-Davie, A.F.M.	L. 1	14.7	62.3 1.1	100.0 6.7				
300	Fisher, F.	M. L. 2	14.5	60.4 0.9	103.8 6.5				
124	Given, R.F.	L. v 1	15.5	57.2 2.0	84.0 6.0				

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.
171	Green, C.G.....	Up. 3	12.5	57.4 1.4	91.8 3.0
345	Guest, J.J.	Up. Sh. (s)	15.7	66.1 1.1	123.0 8.2
432	Harding, C.H. ...	L. Sh.	14.0	54.3 2.0	74.5 7.2
181	Harvey, E.M.....	M. L. 2	14.7	61.8 2.3	107.8 12.3
333	Heaton, G.	L. iv	14.0	60.5	96.0
323	King-Harman, W.A. L. 3		13.2	57.4 1.9	85.0 5.0
437	Kingsbury, W.E.	Up. Sh. (s)	15.9	55.0 1.5	100.5 11.2
492	Knight, S.M.	L. Sh.	12.10	56.0 1.2	87.8 5.5
24	Latter, H.	Up. v	14.1	62.0 2.0	104.5 11.0
567	MacInnes, W.R....	M. L. 1	14.8	59.6 1.1	93.5 6.5
506	Matthewa, W.A...	M. iv (b)	14.0	64.2 2.2	118.0 11.5
156	Meeres, E.W.M....	Up. Sh. (b)	14.4	59.0 0.7	103.0 16.8
126	Michell, R.T.	Up. iv (s)	14.1	62.5 1.5	104.0 5.7
462	Miller, G.A.	M. iv (b)	14.2	61.5 2.0	100.5 8.0
294	Mullens, H.A.....	ii	12.9	58.8 0.8	111.3 6.3
410	Pennethorne, H.E.	M. M. 2	13.11	59.5 0.7	97.3 0.5
184	Poynton, F.J.....	M. iv (b)	12.8	57.2 2.2	96.0 8.2
210	Price, W.B.....	L. Sh.	14.0	58.3 1.5	85.5 3.7
552	Rogers, A.E.	M. M. 1	14.10	57.9 1.7	98.5 9.5
439	Rolleston, G.L. ...	L. v 1	15.0	60.9 1.6	88.5 3.5
378	Rose, W.A.....	M. L. 1	15.0	67.0 1.7	144.0 16.0
439	Stansfeld, H.H.G.	M. L. 1	12.0	55.6 1.6	84.0 6.7
357	Stayner, F.S.....	M. M. 2	15.11	66.1 1.0	148.0 10.5
242	Streadfeld, G.E.S.	L. iv	12.11	61.5 1.4	101.5 8.5

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.
458	Tyssen, H.S.	M. L. 1	14-10	62-4 2-9	110-3 18Q
572	Vans-Agnew, E.L. Up. iv (a)		14-3	61-6 1-3	94-5 4-0
186	Waller, E.H.	M. L. 2	15-11	67-0 2-2	144-5 14-5
169	Wanklyn, J.A. ...	L. III	13-2	57-7 1-4	78-8 5-3
443	White, W.G.	L. v 2	15-1	60-8 2-8	97-5 13-2
510	Whittow, E.S. ...	M. M. 2	15-4	60-9 1-3	97-0 7-5
490	Winterbotham, H.B. M. M. 2		14-11	67-5 2-5	131-0 13-7

BOYS ENTERED JANUARY, 1882. WEIGHED FEBRUARY, 1882.

No.	Name.	Form.	Age. Years.	Height. in.	Weight. lbs.	Circumference of			Near Sight, 12 in.	Far Sight, 10 ft.	Place of Birth.
						Head. in.	Chest. in.	Leg. in.			
494	Adoy, G.	L. iv	14-4	58-3	89-0	26-5	20-7	8-1	7-4	13 9	London
504	Alger, H.	M. L. 2	13-9	57-3	90-5	27-0	20-6	11-4	7-8	10 8	Plymouth
43	Beakerville, G.K. Up. iv (b)		14-6	58-7	95-5	27-5	21-1	11-4	7-6	18 7	Crocombe
199	Beatty, C.V.R.	ii	12-11	60-0	91-0	27-0	21-0	10-5	7-2	11 1 1/4	Redcar
425	Beynon, H.L.	M. M. 2	13-8	57-0	80-0	25-5	20-0	10-5	7-0	16 11	Jeypore
308	Boileau, K.	L. Sh.	12-4	58-3	82-8	25-0	21-5	11-0	6-9	20 7	Hethel
257	Bolton, M.C.	ii	11-10	56-0	80-5	24-5	20-6	10-6	7-2	10 8	Bury St. Edmunds
417	Bowring, H.J. ...	L. III	12-1	53-5	82-0	25-2	20-5	11-2	7-8	20 9	Liverpool
530	Browne, E.	ii	12-10	57-5	87-8	26-0	20-7	10-8	7-4	12 8	Surbiton
250	Bryans, E.H.L. ...	M. iv (a)	14-10	62-0	108-5	28-5	20-5	12-0	8-2	23 13	Caen
534	Bulman, H.G.	Up. III	13-6	62-0	99-5	27-0	21-0	10-9	7-7	16 12	Simla

No.	Name.	Form.	Age. Years.	Height. in.	Weight. lbs.	Circumference of			Arm. in.	Near Sight. 12 in.	Far Sight. 10 ft.	Place of Birth.
						Chest. in.	Head. in.	Leg. in.				
10	Burnaby, R.B. ...	Up. iv (b)	12-0	57-3	92-8	26-8	21-4	11-9	8-0	16	9	Leicester
557	Burness, A.G.	Up. iii	13-2	57-3	87-5	25-8	21-0	11-0	7-2	20	9	Blackheath
78	Chambers, C.G. ...	L. iv	11-7	58-0	88-0	26-8	21-0	11-5	7-2	17	7	West Halsey
280	Codrington, R.E.	Up. iii	18-1	61-2	112-5	28-8	21-5	12-3	8-3	21	12	Richmond
555	Coles, H.E.	Up. iii	13-8	59-6	89-0	25-0	21-4	10-8	7-1	16	7	London
875	Comber, H.G.	L. Sh.	12-3	58-4	90-8	25-0	20-2	11-5	7-3	16	9	Valparaiso
166	Danvers, F.J.	Up. iii	14-0	61-2	99-8	26-6	20-8	11-4	7-6	14	7	Kensington
577	de Montmorency R.H.L.J.M. M. 1		15-0	62-0	104-5	27-5	21-0	11-6	8-3	25	12	Montreal
95	Ellis, F.N.	M. iv (a)	14-8	68-7	143-5	31-0	21-7	13-6	9-3	23	5	Weymouth
94	Etheridge, L.S. ...	L. v 2	14-0	59-1	90-5	27-9	20-0	12-0	7-2	11	12	Hinton, Hants
461	Evans, R.G.	M. iv (b)	13-10	61-2	112-5	27-4	22-0	12-5	8-3	15	9	Stamford
223	Everett, E.F.	M. L. 1	14-1	66-3	144-5	30-0	21-1	14-5	10-0	16	10	Berry Pomeroy
174	Feilden, R.R.	L. iv	14-10	62-0	106-5	28-0	20-3	11-5	8-0	12	9	Bebington
206	Fletcher, C.E.	Up. iv (b)	13-4	60-0	105-8	27-6	21-7	12-2	8-0	17	9	Oxford
20	Giveen, H.M.	Up. iv (a)	12-10	55-0	74-0	23-8	21-0	10-8	7-0	19	6	London
864	Harvey, R.N.	M. iv (b)	13-9	55-9	84-5	27-0	20-5	11-5	7-0	13	8	Clifton, Bristol
322	Henley, C.B.	ii	13-0	58-5	92-8	26-5	21-5	11-2	8-3	21	12	Putney
286	Hickman, J.O.	L. iii	11-8	52-5	69-8	24-0	20-7	10-5	6-6	20	11	Wolverhampton
573	Keeling, A.T.	M. iv (b)	14-6	66-0	124-5	28-8	21-3	13-0	8-0	8	9	Kensington
107	Kitto, W.W.M. ...	ii	12-11	56-7	83-5	26-0	20-5	10-8	7-3	13	13	Poplar
101	Kitto, H.	ii	11-7	52-5	78-0	25-5	21-2	11-0	8-0	16	10	Poplar
112	Maurice, W.B. ...	L. iv	13-10	60-1	90-0	26-6	21-1	11-1	7-2	17	9	Reading
420	Newman, B.W. ...	Up. iii	13-10	56-5	88-8	26-5	21-7	11-5	7-5	20	11	Stamford

No.	Name.	Form.	Age. Years.	Height. in.	Weight. lbs.	Circumference of Chest. in.	Head. in.	Leg. in.	Arm. in.	Near Sight, 12 in. 10 ft.	Far Sight, 12 in. 10 ft.	Place of Birth.
231	Olivier, A.C.	Up. iv (a)	14-8	57-7	99-5	25-8	20-8	11-3	7-8	16	8	Wilton, Wilts
478	Padwick, E.D.	M. iv (a)	13-3	59-0	98-5	26-5	20-8	12-0	8-0	18	7	Horsham
282	Pochin, E.A.N. ...	M. M. 1	14-1	59-7	98-0	27-5	20-5	11-3	8-3	26	11	Sibley
219	Pratt, A.T.	M. iv (a)	14-7	63-0	110-0	28-0	21-3	12-0	8-0	20	8	India
51	Preston, R.D'A.	L. v 2	14-7	60-0	90-5	25-5	19-9	11-2	7-1	20	7	Sandgate
180	Procter, G.H.	L. iii	13-0	55-9	80-8	24-0	20-0	11-0	7-9	15	9	Southampton
408	Rooke, H.P.W. ...	ii	12-6	58-0	78-5	24-5	20-5	9-9	7-2	18	9	Bampfham
378	Simon, A.P.	L. iii	12-4	56-7	94-0	26-6	21-2	12-0	8-0	18	11	London
533	Smith, J.M.	Up. iv (b)	14-3	59-9	96-0	27-7	21-7	11-8	7-7	9	11	Liverpool
407	Smith, T.P.	M. L. 2	13-10	62-9	114-8	23-8	21-6	12-7	8-3	18	9	Birmingham
456	Smith, G.H.B.	Up. iv (b)	13-10	54-3	72-8	24-8	21-2	10-9	7-2	15	10	Harrow
339	Smith, B.M.	M. iv (a)	12-1	59-0	89-3	26-4	20-3	11-2	7-4	20	4	Tedstone Delamere
437	Swinhoe, E.	L. Sh.	12-3	57-1	86-5	26-0	22-0	11-5	7-3	20	12	India
539	Thynne, A.G.	Up. iv (a)	15-0	62-8	107-5	28-7	21-6	12-5	7-7	18	11	Penstowe
127	Tindall, A.L.B. ...	Up. iii	13-5	57-5	96-8	26-5	21-7	11-8	8-0	23	8	Worcester
385	Waterfield, B.C.	M. L. 2	13-3	58-5	95-5	26-8	21-0	11-5	7-5	15	6	Peshawar
515	Whittow, T.	ii	12-2	57-2	83-0	25-9	20-5	10-4	7-0	19	10	London
301	Wilkinson, C.J.R.	L. iv	13-8	55-3	89-0	27-5	20-6	11-1	7-4	17	8	Birmingham
491	Woolbright, H.V. ...	M. L. 2	13-11	62-6	106-3	27-5	21-0	12-0	7-8	24	11	London
440	Wright, H.	ii	10-8	52-2	70-5	23-7	20-7	10-5	7-2	19	10	Keighley
363	Yeames, W.	L. Sh.	13-0	54-5	72-3	24-0	20-5	10-4	7-0	17	8	Tayaurog, Russia

BOYS WEIGHED MAY, 1875, 1877, 1879, 1880, 1881, 1882.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.
399	Fenshawe, B.	M. U. 1	18-6	66-4 0-9	132-7 9-4
218	Williams, A.W.A.	Up. v	17-4	68-0 1-0	130-0 3-0

BOYS WEIGHED MAY, 1876, 1878, 1880, 1881, 1882.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
264	Callender, W.J. ...	L. v 1	17-9	67-2 3-0	139-0 23-5	33-0 2-3	22-2 —	12-8 0-8	10-0 0-6
31	Davies, M.L.	vi	17-7	67-5 5-0	137-2 21-4	30-6 1-6	21-8 0-2	11-8 0-6	9-2 0-2
471	Fox, T.H.a	vi	18-11	68-7 10-2	140-0 62-0	32-0 4-0	22-1 0-6	13-5 2-5	11-0 3-0
177	Hardy, R.	M. U. 2	17-1	65-9 4-8	161-5 42-0	33-0 3-0	22-8 0-3	14-2 1-1	10-2 1-2

a Six years' increase.

BOYS WEIGHED MAY, 1877, 1879, 1880, 1881, 1882.

313	Boulton, W.W. ...	M. M. 1	16-10	65-7 0-8	150-5 12-8
459	Fox, G.	L. v 2	16-8	63-9 1-7	133-0 14-0
325	Reiss, H.J.	vi	17-10	65-0 0-8	130-0 7-7

BOYS WEIGHED MAY, 1878, 1880, 1881, 1882.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
65	Beatson, D.J.M. ...	M. U. 1	17-10	69.0 3.6	134.0 19.5	31.5 1.5	21.7 0.1	12.7 0.5	9.3 0.8
137	Cholmeley, H.W....	Up. Sh. (b)	14.1	59.9 4.9	93.0 20.7	26.5 2.0	21.2 0.3	11.7 1.0	7.4 0.7
201	Creeke, H.B.	vi	17.5	67.1 3.0	180.0 29.0	32.4 2.4	22.3 0.3	12.3 0.3	9.9 0.7
380	Freeman, H.R. ...	Up. v	18.2	65.4 4.4	131.0 29.2	31.5 2.6	22.1 0.2	13.7 1.6	9.5 0.5
144	Hedley, W.C. ...	M. U. 1	16.4	69.4 5.8	142.7 31.7	33.0 2.5	22.5 0.4	13.1 1.1	9.5 1.0
317	Leach, N.	Up. Sh. (b)	15.2	62.5 5.7	105.0 25.0	27.5 1.3	21.4 0.3	11.7 1.5	7.4 0.3
133	Mangin, R.R.	vi	18.7	69.2 2.0	162.5 26.2	32.5 1.8	21.5 0.1	14.0 0.5	10.0 -0.2
343	Ouvry, E.C.	M. iv (a)	15.10	60.8 4.1	95.5 15.5	27.5 1.5	21.0 0.1	11.4 1.4	8.0 0.5
9	Sandeman, V.S. ...	M. M. 2	16.0	67.0 6.3	138.0 38.0	31.0 3.0	22.0 0.5	13.2 1.2	9.2 0.7
60	Streatfield, H.C....	Up. v	15.6	67.1 6.3	135.5 34.0	31.5 3.5	22.0 0.5	13.3 1.6	9.3 0.6
423	Templer, F.N.....	M. U. 1	16.9	66.6	138.5	31.8	21.8	13.1	10.0

BOYS WEIGHED MAY, 1879, 1880, 1881, 1882.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	2 years' increase.
274	Badcock, A.J.	Up. iv (b)	15.11	60.0 2.0	94.0 8.2	
588	Brooking, A.H. ...	L. v 2	16.5	67.8 2.1	117.0 8.2	
271	Browne, G.H.S. ...	Up. Sh. (a)	15.10	69.0 2.4	136.5 12.2	
337	Collett, B.S.....	Up. iv (a)	16.3	64.4 1.4	121.0 12.7	
389	Cooper, G.E.	M. L. 1	15.9	65.0 6.7	118.5 38.0	
486	Davis, E.H.	M. U. 1	16.10	68.9 1.4	165.5 21.2	
462	Few, R.E.....	M. U. 2	16.10	63.3 2.3	104.5 10.6	

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	3 years' increase
294	Fox, H.O.	M. U. 1	15·8	69·0 2·4	134·8 16·8	
466	Ganon, J.P.	L. v 1	17·2	69·0 2·0	138·5 8·7	
194	Gregory, C.A.O.T.	L. iv	14·11	60·0 2·8	97·8 13·5	
331	Home, J.A.	Up. Sh. (b)	15·11	60·6 2·6	101·0 14·5	
497	Latham, W.H.	Up. Sp. (a)	17·3	69·0 7·0	116·3 30·8	
536	Leslie, B.	L. v 2	16·7	64·8 2·8	115·5 14·5	
533	MacIlwraith, R.M.	L. v 1	16·10	67·4 0·4	135·3 8·3	
173	Nicholson, J.	Up. iv (b)	15·6	67·5 2·9	120·2 17·7	
229	Pepys, H.F.	Up. iv (a)	17·0	68·5 3·1	121·0 22·0	
350	Swinton, J.E.B. ...	M. U. 2	17·9	69·0 —	146·5 10·0	
362	Teesdale, E.J.	Up. iv (b)	16·0	64·9 2·4	135·0 16·0	
587	Yeates, F.W.	M. M. 1	16·5	69·8 1·4	157·0 4·5	

BOYS WEIGHED MAY, 1880, 1881, 1882.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
561	Allen, P.E.	M. iv (b)	16·0	64·5 5·5	105·0 22·0	27·8 0·9	21·5 0·5	11·2 0·7	8·0 0·5
570	Batley, R.A.	M. L. 1	14·1	60·1 3·7	102·0 19·0	27·8 1·8	20·6 0·1	11·5 1·0	8·1 0·6
383	Berkeley, R.T.M. ...	L. iii	14·7	57·8 3·3	93·8 13·8	27·4 1·4	20·5 —	11·9 1·4	7·7 0·3
415	Bett, T.O.	M. M. 2	13·9	62·2 3·3	117·0 16·5	29·0 2·0	21·5 —	13·3 0·8	9·0 —
496	Brooke, R.G.	M. U. 2	15·7	63·6 3·5	105·5 12·0	30·0 1·5	22·0 —	11·5 0·8	8·8 1·2
182	Burrows, P.	L. iii	13·9	57·5 2·9	97·7 13·2	26·5 0·5	21·5 0·4	12·3 0·3	8·3 0·3
244	Casson, H.A.	L. v 1	15·0	64·5 6·0	117·0 26·3	28·8 2·3	21·0 0·5	12·0 0·8	9·0 1·1

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
89	Clayton, F.	M. U. 1	15.0	64.4 5.2	105.0 22.5	27.0 1.0	20.3 0.2	11.4 0.9	7.6 0.4
484	Colville, H.C.A. ...	M. L. 1	14.0	62.6 2.8	109.0 17.5	26.0 -0.5	21.5 -0.1	12.2 1.2	8.0 0.5
395.	Cooper, H.J.	M. iv (b)	14.6	61.1 3.6	100.0 15.7	27.0 1.5	20.8 -0.9	12.0 0.8	7.5 -0.4
502	Dawson, E.B.	Up. Sh. (b)	16.8	71.5 4.6	189.0 27.0	30.0 1.9	21.5 —	13.0 0.5	9.0 0.9
267	Dobie, H.	M. M. 1	16.11	60.2 3.2	91.0 14.7	26.0 1.0	21.0 —	10.8 0.8	7.5 0.5
164	Elles, J.M.	M. U. 2	16.3	62.9 4.3	120.0 24.5	28.7 1.0	21.5 0.1	13.6 2.1	8.6 0.2
640	Forbes, J.O.	Up. Sh. (b)	15.4	66.7 5.4	127.5 30.0	28.5 1.0	21.5 0.3	13.0 1.9	8.6 0.9
560	Hill, H.B.	M. M. 2	15.2	68.0 6.1	130.0 30.5	28.5 1.0	22.0 0.3	12.7 1.2	8.8 0.9
261	Hill, R.B.	L. iii	13.11	60.8 3.7	105.5 16.5	27.6 1.1	21.7 —	11.5 0.8	8.0 0.3
559	Jenner, L.L.C.A....	Up. Sh. (e)	16.5	64.9 4.4	131.7 26.7	29.8 2.8	22.0 0.3	13.7 1.0	9.3 1.1
412	Langworthy, R. ...	Up. iii	13.6	56.6 2.8	81.5 9.5	25.5 0.4	21.8 0.9	11.6 0.6	7.5 0.5
458	Lowndes, H.M. ...	M. M. 2	15.6	60.7 3.0	98.0 14.7	25.7 0.2	22.0 —	11.5 0.5	7.4 0.3
309	Percival, A.P.	L. iv	14.0	55.4 2.0	76.0 5.0	25.4 -0.3	21.7 -0.3	9.8 0.6	7.0 —
477	Petrie, C.L.R.	M. U. 2	15.5	62.8 6.7	115.0 32.5	28.5 3.0	21.5 0.5	11.6 0.7	9.3 1.8
87	Rotheram, W.H. ...	M. U. 1	16.3	73.0 5.0	168.0 36.0	35.5 4.5	22.9 0.4	14.4 1.4	9.7 0.8
168	Walker, L.S.	L. iii	12.10	55.5 2.0	76.0 4.0	24.4 -1.0	21.4 0.2	10.2 —	6.5 -1.2
161	White, B.F.	L. iv	15.0	58.9 3.9	83.0 6.0	27.8 1.7	21.0 —	10.5 0.5	7.6 0.1
16	Williams, W.S.	M. M. 1	15.11	64.0 5.5	123.0 33.5	30.0 3.1	21.3 0.8	12.3 1.3	9.3 1.4

BOYS WEIGHED MAY, 1881—1882.

113	Adams, J.H.	L. Sh.	12.0	55.0 1.3	81.0 6.0				
279	Alexandroff, J.	M. L. 1	15.1	63.1 2.6	104.5 7.5				
71	Allen, A.G.	Up. iv (e)	14.10	67.9 2.2	134.8 15.8				

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.
178	Boldero, W.	Up. iii	12-10	54-9 1-6	80-0 7-5
529	Calraes, F. H.	M. L. 2	14-6	60-8 2-3	97-5 10-0
513	Cooke, W. G.	Up. Sh. (b)	15-10	67-8 1-8	130-0 10-2
167	Cowley Brown, G. C.	L. Sh.	13-1	54-7 0-9	80-0 13-0
158	Darell Brown, H. F.	Up. iv (a)	14-11	62-2 1-4	92-0 7-0
91	de Satgé, E. E.	M. L. 2	14-8	56-5 1-9	72-3 4-5
122	Ford, F. C.	M. iv (b)	14-8	65-5 2-0	132-0 16-0
236	Gordon, F.	Up. iv (a)	15-5	58-3 1-8	87-8 11-8
21	Hayhurst, H. F. ...	L. v 1	15-6	60-3 1-3	96-0 6-5
501	Hilleary, L. M.	Up. Sh. (b)	14-9	64-1 1-4	108-5 8-5
85	Lambert, C. H.	M. L. 1	13-11	57-1 1-1	83-3 5-0
135	Lascelles, W. C. ...	M. L. 1	14-10	65-4 2-0	108-0 8-2
136	Lascelles, R. F.	Up. iii	13-5	63-5 1-8	97-5 11-7
472	Linnell, A. J.	Up. Sh. (a)	15-7	66-2 2-3	116-2 15-9
429	Logan, N. W.	M. L. 2	14-5	58-5 2-0	87-5 7-2
291	Martyn, A.	L. iv	13-6	63-4 2-8	108-8 11-8
568	Merry, W. J. C.	L. v 2	14-10	64-9 2-5	130-0 14-7
83	Pemberton, E.	M. L. 1	13-11	56-5 1-0	84-8 6-0
340	Robertson, W. H. ...	M. iv (a)	13-8	62-7 1-6	115-0 12-0
311	Verity, E. G.	ii	13-1	54-9 4-6	76-3 3-5
491	Willis, H. H.	M. iv (a)	15-4	63-4 1-7	112-5 8-5
483	Woodhouse, A. L. ...	M. M. 2	15-10	61-6 2-3	96-7 10-9
205	Yeatman, F. P. S. ...	M. iv (b)	12-7	57-9 1-5	82-5 11-0

BOYS ENTERED APRIL, 1882. WEIGHED MAY, 1882.

No.	Name.	Form.	Age. Years.	Height. in.	Weight. lbs.	Circumference of		Arm. in.	Drawing Near power, Sight, lbs. 12 in. 10 ft.	Place of Birth.			
						Chest. in.	Head. in.						
498	Ascherson, E.M. ...	M. iv (b)	14·8	55·3	82·5	25·6	20·9	9·9	7·3	32	12	8	Liverpool
355	Badcock, G.H.	ii	10·11	55·0	76·5	24·5	20·0	10·5	6·6	32	14	9	India
448	Braithwaite, W.G. ...	ii	11·7	57·5	95·7	25·7	21·7	11·2	8·3	32	22	12	Kendal
253	Browning, F.H. ...	M. iv (a)	13·11	57·5	94·0	27·0	21·5	12·1	8·1	36	19	12	Dublin
386	Clerke, St. J.G.S. ...	M. L. 2	13·0	59·2	98·0	26·8	21·0	11·9	7·7	50	18	10	Sandgate
548	Coape-Smith, H. ...	M. M. 1	13·7	57·3	83·5	27·5	20·2	10·5	7·4	36	20	10	India
398	Dawson-Thomas, E.M.L. Sh.		13·0	59·2	91·2	25·2	21·2	11·1	7·3	35	18	9	Exmouth
514	Douglas, W.S.S. ...	ii	12·2	52·4	69·5	23·8	20·2	10·5	7·2	31	16	8	Weston-super-mare.
204	Drew, H.R.	L. iv	13·1	57·4	78·7	25·5	21·0	10·0	7·0	40	16	10	Westminster
498	Ellison, G.P.	M. L. 1	13·5	62·4	106·5	28·4	21·2	11·9	7·8	44	12	8	Lincoln
191	Franks, G. McC. K.	M. iv (a)	13·7	61·2	92·0	26·3	21·0	11·3	7·2	51	18	9	Edinburgh
47	Gray, C.H.	Up. iii	13·1	55·0	92·0	25·0	20·2	11·1	6·8	33	10	1	Pateloy Bridge
543	Harington, A.H. ...	L. iv	13·11	62·6	99·7	28·0	20·2	11·7	7·8	33	22	9	Lucknow
544	Harington, H.A. ...	Up. iii	13·2	58·8	78·2	24·8	20·3	10·3	6·6	38	15	10	Lucknow
100	Hildebrand, G.L. ...	M. L. 2	13·9	66·4	132·0	31·0	21·1	12·9	8·7	61	22	14	India
431	Hulme, F.H.	M. L. 2	15·0	68·3	109·7	26·6	21·0	12·2	7·5	49	14	9	Essex
449	Hussey, H.D.	L. iv	14·11	59·5	92·2	27·4	20·7	11·0	7·4	46	8	1½	Exmouth
369	Kruger, A.E.	ii	12·6	56·0	86·2	25·2	21·1	11·2	7·3	40	19	10	Long Island, U.S.A.
352	Leveson, H.G.A. ...	ii	12·8	60·2	98·2	26·0	21·5	11·6	7·4	38	18	12	Sydenham.
207	Mackworth, D.	M. L. 2	14·0	57·1	81·5	26·0	21·0	10·3	7·0	34	20	11	London
227	Macpherson, R.G.	Up. iii	12·11	58·7	84·7	25·0	20·6	10·8	7·3	30	17	8	India
536	Munkton, G.E.	Up. iii	13·6	61·0	87·5	26·2	20·8	10·8	6·9	48	4	2	East Moulsey

No.	Name.	Form.	Age. Years.	Height. in.	Weight. lbs.	Circumference of			Arm. in.	Near Sight, 12 in. 10 ft.	Far Sight, 12 in. 10 ft.	Place of Birth.
						Chest. in.	Head. in.	Leg. in.				
172	Nicholson, H.	Up. iv (b)	14.1	53.7	69.7	23.0	20.2	9.5	6.1	28	12 14	Lewes
12	Ommanney, F.F.	M. iv (a)	13.7	60.4	89.5	25.8	20.9	11.8	7.5	32	19 10	East Sheen
153	Petley, H.	ii	11.9	55.3	68.7	25.0	20.8	9.2	6.2	25	9 8	Newfoundland
179	Plumtree, C.B. ...	Up. iv (a)	14.3	61.8	105.2	27.5	20.3	12.4	8.2	54	19 9	Claypole, Linc.
409	Porter, W.N.	M. iv (b)	14.4	57.6	76.0	25.5	20.9	10.5	6.3	31	17 10	Warrington
365	Prowee, C.B.	Up. iii	12.11	57.2	80.0	26.0	20.8	10.8	7.3	36	19 11	Taunton
111	Robinson, A.S.	L. iv	13.1	57.3	81.2	25.0	20.0	10.5	7.1	31	10 10	Tulse Hill
388	Rowell, W.J.	L. Sh.	12.11	58.8	96.7	24.8	20.5	11.2	8.3	40	23 12	Singapore
80	Sale, W.W.	M. iv (b)	13.8	59.5	87.5	27.4	20.8	10.5	7.2	35	20 12	Grasmere
33	Simpkinson, E.V.	M. iv (b)	13.0	52.5	73.7	24.8	20.1	10.0	6.7	29	17 8	North Creake
24	Simson, J.M.	ii	11.4	55.0	75.7	24.8	21.1	10.2	6.8	28	15 10	London
509	Smallwood, J.E. ...	M. iv (a)	13.6	57.5	91.7	25.0	20.6	10.6	7.2	30	14 9	Castle Bromwich
246	Tate, J.C.	Up. iii	12.8	59.7	101.0	26.0	22.4	12.5	7.6	28	18 9	Sevenoaks
203	Ussher, P.J.	M. L. I	13.8	60.5	98.0	26.0	22.1	10.9	8.0	35	19 13	Monkstown
454	Windeler, W.B. ...	Up. iii	13.2	52.5	72.5	25.0	20.7	10.3	7.2	44	10 6	Surbiton
97	Wyatt Smith, H. ...	M. iv (a)	13.8	60.1	104.2	27.8	20.5	11.5	8.3	49	12 14	Walmersley

BOYS WEIGHED OCTOBER, 1876, 1878, 1880, 1882.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest.		Head. in. inc.	Leg. in. inc.	Arm. in. inc.
						in. inc.	in. inc.			
11	Gardiner, E.N. ...	vi	18.9	66.5 3.0	160.7 29.2	34.7 2.9	22.3 0.3	15.0 1.3	11.2 1.4	
70	Mason, F.E.	M.U. I.	18.0	67.5 3.6	149.0 26.2	32.7 1.7	22.2 0.2	14.0 1.4	9.8 1.1	
411	White, E.D.	M.U. I.	17.4	65.5 5.5	124.5 27.0	28.5 0.7	21.6 0.1	13.1 1.2	8.8 0.8	

WEIGHED OCTOBER, 1877, 1879, 1880, 1881, 1882.

No.	Name.	Age. Years.	Form.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
74	Bradburne, C.R.	16·8	U. Sh. a.	69·2	1·2 135·5	8·0			
249	Bryans, A.H.	17·5	U. Sh. b.	69·9	0·2 154·0	9·0			
125	Chichester, A.G. de V.	16·0	M. U. 2	61·0	3·0 105·5	10·5			
1	Elliot, G.J.	18·6	vi	67·6	3·1 135·5	14·5			
18	Roberts, C.H.	17·2	vi	73·2	1·2 153·0	10·5			

WEIGHED OCTOBER, 1878, 1880, 1882.

327	Bligh, F.	16·4	M. U. 2	64·3	5·3 118·5	23·2	23·8	0·8	20·7	—	12·2	1·0	8·3	0·4
240	Bliss, C.E.	15·10	M. M. 2	64·7	3·9 105·0	15·0	29·0	1·5	22·3	0·3	11·9	1·1	7·2	0·2
569	Carey, H.M.	18·11	vi	68·3	0·5 152·0	9·0	33·0	0·2	22·0	—	14·0	0·6	9·7	0·7
139	Chappel, H.R.	15·6	M. v	65·7	4·8 125·5	23·0	23·0	0·5	22·0	—	13·2	0·7	8·3	0·8
319	Dowding, H.A.	17·4	L. v 2	65·6	4·9 126·5	27·7	29·5	0·8	21·8	0·3	12·7	1·2	8·5	0·6
233	Feetham, C.	17·1	U. iv a	68·0	2·8 121·5	21·5	29·9	0·9	21·6	0·3	12·5	1·3	8·5	0·7
474	Ferguson-Davie, H.A.	17·2	U. v	69·2	5·7 147·0	32·0	30·5	1·7	21·8	0·3	13·7	1·2	9·3	1·1
123	Footman, J.	16·11	L. v 2	70·0	6·1 132·0	33·0	31·2	3·2	21·8	0·3	12·5	1·5	8·6	1·3
13	Horsburgh, C.W.	18·3	vi	72·3	2·7 162·0	25·0	33·5	2·9	21·6	0·1	14·1	1·3	9·8	1·3
416	Manton, H.R.	16·4	M. U. 2	63·4	4·3 119·5	21·5	23·4	0·4	21·6	0·4	12·4	1·4	9·0	1·0
59	Martin, D.E.	16·2	M. v	65·0	4·7 138·5	32·5	30·8	1·8	21·8	0·6	13·6	1·6	9·4	1·0
200	Orr, H.H.	17·10	M. v	67·0	4·0 141·0	28·0	30·3	0·4	21·7	0·2	13·5	1·0	9·4	0·8
293	Prichard, M.S.	17·10	M. v	67·3	4·7 120·7	24·7	28·0	0·5	20·9	0·5	13·1	1·2	8·3	0·8
108	Stothard, L.H.K.	17·0	M. U. 1	65·2	8·4 121·5	33·0	29·0	2·8	21·8	0·3	13·0	1·5	8·4	0·7
33	Warren, A.K.	16·7	M. iv b	65·7	6·2 133·0	34·5	32·0	—	22·0	0·9	13·2	1·1	9·8	1·8
149	Woolner, H.	16·1	L. v 1	71·7	5·5 165·5	35·5	34·6	3·1	22·8	0·3	14·7	1·6	10·3	1·6

WEIGHED OCTOBER, 1879, 1880, 1881, 1882.

No.	Name.	Age. Years.	Form.	Height. in. inc.	Weight. lbs. inc.
336	Bell, H.L.	15·6	L. v 2	59·8 3·8	93·5 17·0
145	Bucknall, H.C. ...	16·1	M. L. 1	64·1 3·4	119·6 14·0
589	Bull, F.E.	16·2	vi	68·9 1·6	148·5 8·5
546	Chaine, W.	17·5	M. v	69·0 0·2	135·5 3·0
239	Fairbairn, A.M. ...	15·11	M. L. 1	68·5 3·5	120·0 16·8
26	Ffenden, G.C.F.A.S. 16·7		U. Sh. b	64·0 1·5	122·0 8·0
17	Harding, G.V. ...	17·8	U. v	66·0 0·3	146·7 7·2
256	Hill, W.A.	16·9	U. iv a	61·9 2·2	104·0 6·2
367	Hill, T.H.	15·6	M. L. 2	59·9 1·9	98·5 9·5
258	Hughes, E.H.	16·8	vi	68·2 1·9	147·5 16·5
391	Nicholson, H.F. ...	17·0	L. v 2	65·4 1·4	123·5 —
523	Nowell, R.W.	17·7	M. U. 1	68·5 1·0	156·0 3·7
187	Ogbourne, L.C.W. 15·11		M. iv b	64·9 3·1	117·2 20·9
44	Powles, F.J.E. ...	15·8	U. iv a	63·6 3·3	127·5 14·5
299	Preston, C.S.	17·7	vi	71·4 0·6	161·5 11·5
7	Sale, T.R.	17·7	vi	68·5 1·9	145·0 13·0
541	Sharpe, H.C.	17·4	vi	72·0 0·1	156·0 0·5
196	Thring, L.C.W. ...	16·4	M. v	66·3 1·1	82·0 2·0
318	Trethewy, T.L. ...	15·6	U. Sh. b	65·1 3·4	123·5 20·0
542	Waterfield, O.F. ...	17·10	U. v.	72·2 1·8	170·0 20·0

WEIGHED 1880, 1882.

No.	Name.	Age. Years.	Form.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
396	Alston, J.E.	16:3	U. iv b	65:3 5:3	125:5 36:0	31:5 4:7	21:2 0:7	12:2 1:9	8:7 1:5
525	Belk, C.	16:0	M. M. 1	58:5 2:9	99:5 16:5	26:9 1:2	21:5 0:5	12:1 1:4	8:0 0:5
528	Cairnes, H.M.	14:8	M. L. 1	68:0 5:8	126:8 37:3	28:9 1:9	22:0 0:4	12:5 1:4	8:4 1:2
549	Chaine, J.	16:10	U. Sh. b	66:5 5:3	128:0 25:5	30:3 1:9	22:0 0:5	13:0 1:4	8:9 1:1
596	Clowes, W.A.	16:10	M. M. 1	60:0 2:8	92:0 10:5	25:0 1:0	21:6 0:1	11:6 0:6	7:5 0:1
507	Cochrane, A.C. ...	16:1	M. M. 2	68:1 2:7	144:0 21:0	31:0 1:2	22:0 0:4	13:5 1:0	9:0 0:5
600	Curtis, G.S.	15:4	U. v	64:4 4:3	110:8 29:5	27:8 1:0	21:6 0:5	11:7 0:8	8:0 1:0
67	Daunt, A.	15:9	U. iv	68:7 6:7	134:5 30:5	31:0 2:0	22:0 0:6	13:5 1:8	8:8 1:1
114	De Jersey, B.H.	14:6	M. iv	63:3 3:7	97:3 15:5	26:0 1:5	20:6 0:4	10:8 1:0	7:0 0:4
38	Dundas, R.N.	15:9	L. v 1	67:5 4:1	146:0 25:0	31:5 2:5	22:5 0:5	14:0 1:0	9:2 0:7
297	Hamerton, L.C.	15:9	U. iv a	66:5 4:7	130:5 24:0	30:1 1:4	21:3 1:3	13:1 0:8	8:9 0:9
508	Hayward, J.A. ...	16:7	L. v 2	65:8 5:3	130:0 33:5	28:5 1:5	21:6 0:9	13:8 1:8	9:7 1:5
599	Herbert, E.C.	17:2	M. U. 2	62:0 5:2	117:7 29:9	30:5 4:5	21:8 0:6	13:1 1:6	8:9 1:2
377	Kekewich, H.H.	16:0	M. L. 1	64:2 2:7	123:3 15:3	30:5 1:5	21:4 0:6	12:1 0:6	9:3 0:5
451	Macanlay, P.J.F. ...	15:10	M. U. 2	67:5 5:0	124:5 17:2	28:9 1:1	21:8 0:3	12:9 0:9	8:0 0:5
120	Marsh, N.N.	14:10	M. iv	61:8 6:3	121:7 31:2	28:8 1:8	21:2 0:6	14:0 1:5	8:7 1:0
598	Mavrogordato, S.J. ...	16:5	M. U. 2	63:8 3:3	121:7 20:2	30:2 2:6	20:9 0:1	11:9 0:9	9:1 1:1
512	Neste, R.M.	15:8	M. M. 1	66:8 3:0	140:0 22:5	29:0 1:1	21:8 0:7	14:1 1:1	10:0 1:4
585	Nicholson, R.E. ...	15:5	M. M. 2	65:9 6:1	119:0 23:0	29:4 2:9	21:3 0:3	12:4 1:4	8:5 0:8
16	Olivier, H.E.	16:8	M. v	61:9 5:1	112:5 24:5	28:6 2:6	21:7 0:3	12:3 1:3	9:1 1:0
556	O'Neill, E.A.	16:0	U. Sh. a	67:8 4:8	147:5 32:0	32:5 2:7	21:8 0:5	13:5 1:5	9:3 1:2
438	Palmer, C.S.	13:10	M. L. 2	56:4 4:3	86:5 14:7	26:4 1:4	21:2 0:4	11:4 1:3	7:4 0:4
298	Preston, H.S.	16:3	M. v	69:9 5:5	151:0 34:7	35:0 3:3	23:0 0:8	13:5 1:7	10:5 2:2

No.	Name.	Age. Years.	Form.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
119	Robinson, J.	16.11	U. Sh. a	66.0 2.8	137.5 18.5	31.0 1.4	22.8 1.8	14.5 2.0	9.3 0.1
537	Sheppard, E.B. ...	16.6	L. v 2	59.7 3.9	108.3 23.3	28.2 1.5	21.7 0.5	11.8 1.2	8.3 0.7
231	Stanton, H.L.	14.11	M. M. 1	64.0 3.9	126.5 21.5	30.5 1.3	21.6 0.4	13.0 1.3	9.2 0.9
202	Wood, E.B.	14.8	M. U. 2	67.0 5.2	112.5 20.5	27.3 1.3	21.2 1.1	11.8 1.1	7.5 0.3
562	Wright, J.C.	16.1	U. Sh. a	63.2 4.8	112.0 26.0	30.4 2.6	21.5 0.7	13.0 2.0	8.3 1.3
354	Yale, T.P.O.	14.7	M. M. 1	64.3 5.5	121.0 26.2	30.2 0.4	22.5 —	11.8—0.1	8.7—0.3
422	Young, G.J.	16.8	L. v 1	67.8 5.6	133.0 27.2	29.8 2.0	21.8 0.4	13.0 1.6	9.3 1.1

WEIGHED NOVEMBER, 1881, 1882.

324	Bainbridge, E.G.T.	14.11	M. M. 2	61.5 1.5	102.5 17.0				
547	Barnicot, R.A. ...	14.4	M. U. 2	59.3 0.9	87.0 2.0				
584	Blaason, S.G.	15.5	U. iv b	59.6 2.3	91.0 10.5				
359	Campbell, R.G. ...	15.5	M. L. 1	61.9 2.0	96.5 7.5				
68	Carey, de V.	16.0	M. M. 1	63.1 2.1	112.5 13.7				
138	Chappel, G.P.	14.0	U. iv a	64.1 1.9	125.0 13.2				
30	Davies, C.Ll.	14.3	L. v 2	58.5 1.7	94.5 3.5				
338	Finch, H.K.	12.3	L. iv	54.1 2.1	72.0 3.5				
521	Francis, L.A.	15.9	L. v 2	59.5 3.0	95.5 10.5				
45	Haweis, L.T.J. ...	12.2	L. Sh.	52.5 1.2	72.5 6.0				
400	Hulbert, J.G.	15.1	U. Sh. a	61.9 2.0	108.0 5.5				
143	Kaye, E.P.	14.10	U. Sh. b	67.5 2.5					
538	Landon, E.E.B. ...	15.4	M. L. 2	66.2 3.8	132.0 20.0				
402	Marse, R.E.H. ...	13.1	M. iv a	59.8 1.9	92.0 6.0				
62	Oakley, A.W.	16.3	M. U. 1	66.4 3.3	123.2 11.9				

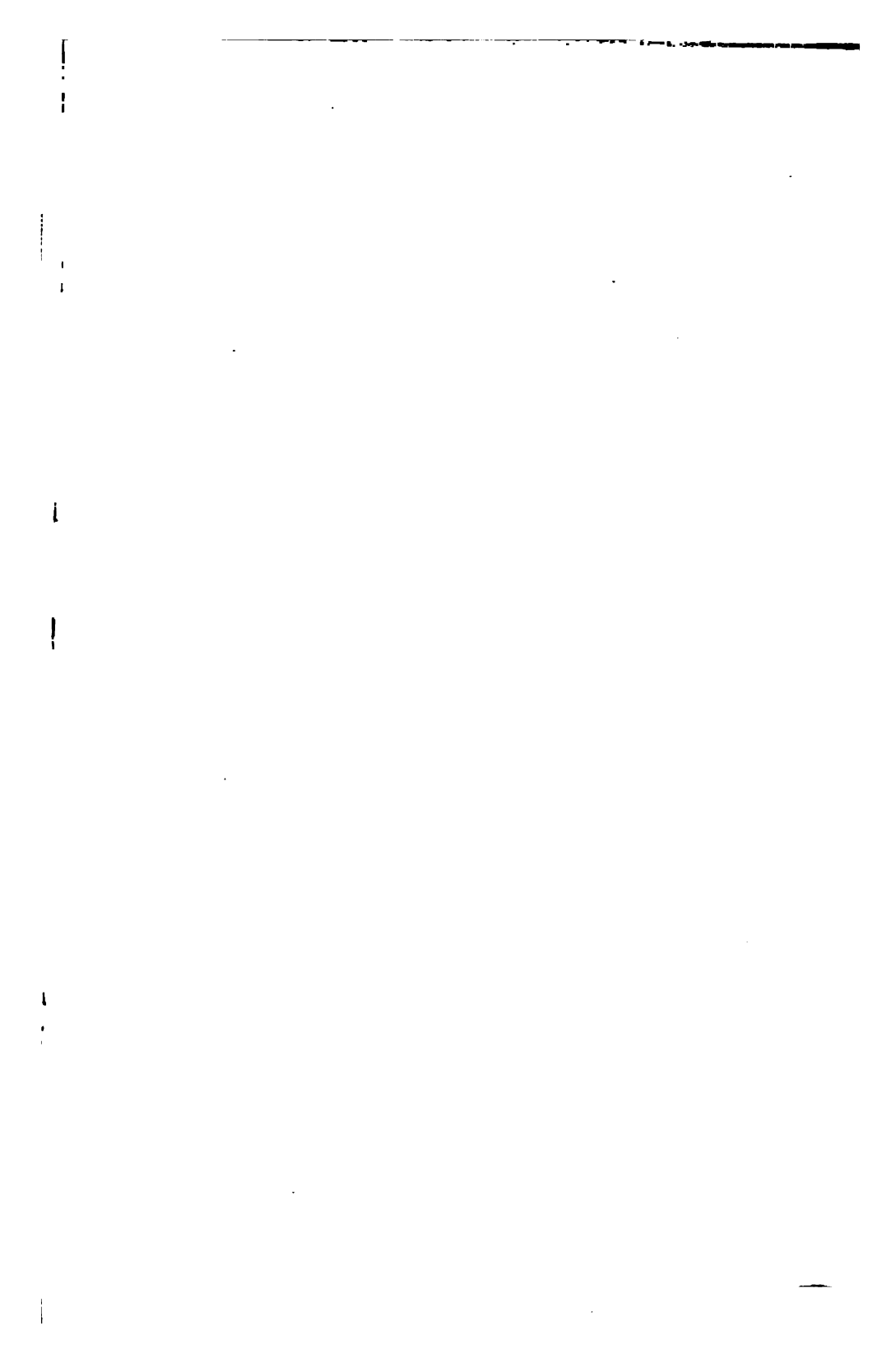
No.	Name.	Age. Years.	Form.	Height. in. inc.	Weight. lbs. inc.
72	Pulleine, H.P.	15-1	M. L. 1	62-2 2-7	113-0 13-0
356	Ridley, G.L.N. ...	13-9	L. Sh.	56-0 3-0	83-5 3-5
372	Sinclair, W.H.M.	13-10	M. iv b	64-8 2-0	147-5 24-5
351	Stansfeld, C.G. ...	11-3	L. Sh.	52-0 1-8	70-0 5-2
185	Stanton, E.A.	14-11	M. U. 2	64-1 2-7	117-0 11-5
545	Watson, G.	15-11	M. L. 1	64-2 3-7	111-0 14-0

BOYS ENTERED SEPTEMBER, 1882. WEIGHED NOVEMBER, 1882.

No.	Name.	Form.	Age. Years.	Height. in.	Weight. lbs.	Circumference of			Arm. in.	Drawing Near Far		Place of Birth.	
						Chest. in.	Head. in.	Leg. in.		power, lbs.	Sight, 12 in. 10 ft.		
247	Barber, W.P.	M. iv b.	13-2	57-8	88-0	24-8	21-0	10-5	7-5	33	21	14	Notting Hill
175	Bardsley, E.J. ...	L. iv	14-0	60-3	101-5	27-5	21-9	12-0	8-0	40	18	7	Greenwich
197	Battine, A.T.	M. L. 1	14-4	56-4	80-5	24-7	20-5	11-0	7-6	36	19	9	Wellesbourne
231	Bell, A.	U. iv b	13-3	53-6	72-0	23-8	20-0	10-3	7-2	30	18	10	Calcutta
263	Bellamy, A.T.	L. iii	12-6	53-7	81-0	25-7	20-5	10-8	7-2	38	12	10	Kings Lynn
264	Bellamy, W.M. ...	L. iii	11-4	56-3	90-0	26-0	21-5	11-0	7-5	41	23	11	Hants
419	Blackall, T.O. ...	M. iv b	12-10	61-8	111-0	28-0	21-0	13-0	8-7	44	16	8	Sevenoaks
381	Browne, F.C.	U. iii	13-3	60-5	93-5	25-3	21-5	10-9	7-5	40	15	7	East Moseley
313	Carey, R.W.C. ...	M. iv a	14-0	56-5	83-0	27-0	20-7	10-3	7-4	28	18	14	Southsea
560	Child, J.F.	L. Sh.	12-3	59-0	91-0	25-0	21-5	11-3	7-3	39	21	13	London
399	Coldwell A.W. ...	ii	11-10	53-7	82-5	26-7	21-0	11-0	7-3	30	12	7	Ladlow
312	Cooper, A.S.	L. Sh.	11-1	57-8	81-5	25-7	21-2	10-2	7-1	33	14	7	Marlborough.
404	Crosley, G.B.	U. iii	13-11	65-0	110-0	26-9	21-4	12-4	7-8	41	7	1	Halifax
239	De Boinville, A.C.	L. iv	14-2	53-7	88-0	25-6	21-2	10-6	7-2	38	18	13	Burton
88	Dolphin, H.E.	ii	10-10	57-2	88-0	25-0	21-0	10-5	7-3	32	13	9	Newark

No.	Name.	Form.	Age. Ycars.	Height. in.	Weight. lbs.	Circumference of			Drawing Near Far			Place of Birth.	
						Chest. in.	Head. in.	Leg. in.	Arm. in.	power lbs.	Sight. 12 in.		Sight. 10 ft.
320	Dowding, W.K. ...	M. iv b	13-8	62-0	116-0	29-0	21-7	12-5	8-7	53	21	11	Marlborough
348	Edwards, H.W. ...	M. M. i	14-7	57-1	85-0	25-0	21-1	11-3	7-6	42	21	12	Mill Hill
183	Elwell, C.L.S.	L. iv.	13-3	56-4	96-5	26-5	21-2	12-0	8-0	46	16	11	Long Ashton
507	Fearon, J.F.	M. M. ii	14-11	60-9	101-0	27-5	21-5	12-0	7-6	40	8	5	London
241	Ferguson-Davie, E.L.C. U. iv a		13-11			25-5	20-3	10-2	6-8				Weybridge
215	Ferguson-Davie, H.H. M. iv b		13-4		82-5					41	17	4	Norwich
293	French, F.C.	L. v 2	14-5	64-3	132-0	30-2	21-5	12-5	9-1	63	18	6	Wickham Market
445	Girdlestone, A.H.	L. v 2	13-3	60-0	95-5	25-7	21-7	11-0	7-5	37	16	25	Jubbulpore
305	Harrison, C.E. ...	U. iv a	13-2	62-8	97-5	27-0	21-0	12-0	8-1	47	13	2	London
121	Hildebrand, A.R.B.	L. iii	12-7	57-0	82-5	24-5	20-3	10-5	7-0	39	24	11	Rooke
432	Hulme, H.M.	ii	12-6	57-3	81-0	24-0	20-3	10-6	7-4	36	18	9	Stratford
315	Inglis, W.R.	ii	13-0	55-2	80-0	24-3	20-5	10-6	7-3	35	12	6	London
287	Irving, H.B.	L. iii	12-3	57-8	84-5	25-3	21-1	11-8	7-2	27	14	17	Bayswater
238	Irving, L.B.	ii	10-10	53-7	69-0	23-2	21-7	10-2	6-7	31	15	7	South Kensington
40	Jones, A.G.	U. Sh. b	14-11	63-8	101-5	26-7	21-5	11-7	7-5	45	16	13	Westbury-on-Severn
229	Jones, A.W.	U. iv b	14-4	59-9		26-0	21-5	11-8	8-3	38	20	10	Meerut
102	Kitchat, S.A.P. ...	L. iv	14-3	62-0	115-5	30-0	21-5	12-5	8-9	62	18	10	Tetbury
316	Laidlaw, H.W. ...	L. iv	14-0	58-2	84-5	24-5	21-4	10-0	7-1	37	17	10	Stoke Fleming
519	Lawrie, N.S.	U. iii	14-0	63-7	110-2	27-8	21-6	11-7	7-8	36	13	10	Bexley
22	Loring, W.L.	L. v 2	14-7	63-3	111-2	29-0	21-6	12-4	8-8	53	23	11	Beebles
526	Lnboock, A.N. ...	U. iii	13-8	60-4	88-5	24-5	21-2	10-9	7-2	39	18	12	London
19	Mac Vicar C.R.	L. v 2	14-5	61-0	100-0	27-7	21-0	11-4	7-7	38	15	6	Weybridge
75	Mahaffy, R.P.	ii	11-9	56-3	75-0	24-7	21-8	9-5	6-6	24	18	9	Dublin
527	Martin, G.E.C. ...	M. iv a	13-10	61-2	107-3	28-0	21-1	12-0	8-8	52	22	11	Cardross

No	Name	Form.	Age. Years.	Height. in.	Weight. lbs.	Circumference of			Drawing Near		Place of Birth.		
						Chest. in.	Head. in.	Leg. in.	Arm. in.	power lbs.		Sight. 12 in. 10 ft.	
260	Miles, E.H.....	L. v 2	14-1	65-5	133-5	29-8	21-8	13-2	9-3	54	17	6	Hampstead
341	Moore, H.	L. iii	13-0	57-0	76-5	24-2	20-5	10-5	7-0	35	18	10	Hampstead
292	Moore, E.A.L. ...	U. iv b	11-11	53-0	68-5	23-8	21-2	9-8	6-4	28	9	5	Oxford
53	Morley, H.L.	U. Sh. b	14-6	62-8	106-0	26-0	21-6	11-3	7-9	44	20	13	Edenbridge
254	Nichols, A.R.	L. iv	13-11	57-7	91-0	26-4	21-4	11-5	7-6	35	13	8	Tasmania
76	Nicholson, C.L. ...	L. iv	14-4	52-1	66-5	23-8	20-4	9-8	6-6	28	14	11	Gibraltar
116	Nixon, F.E.	M. iv b	13-1	54-8	83-0	27-3	21-1	10-8	7-7	34	20	11	Aghmacart
581	Pease, J.W.B.....	U. iii	13-4	58-8	88-0	26-2	20-2	11-3	7-1	38	22	9	Newcastle-on-Tyne
362	Pelham, F.J.T. ...	ii	12-6	55-5	81-0	25-5	21-0	11-3	6-8	27	17	7	Maidenhead
117	Penson, E.A.	U. iii	11-11	55-9	81-0	26-2	21-1	10-5	7-0	36	16	9	Guildford
583	Percival, H.D. ...	L. Sh.	13-0	60-3	82-5	24-6	20-7	9-8	7-0	34	0	14	Clapham
151	Prescott, T.L.....	U. iii	12-3	60-4	93-3	27-4	21-4	11-1	7-4	35	20	11	Luton
495	Radley, C.P.	U. iv b	14-5	65-5	133-0	30-5	22-0	13-1	9-1	60	16	9	Liverpool
91	Robinson, A.B. ...	U. iv a	12-6	59-2	91-0	25-8	21-0	11-0	7-6	40	14	10	Florence
350	Rollston, W.	U. Sh. a	14-2	57-9	85-5	25-0	21-4	10-6	6-9	32	19	7	Oxford
238	Sandya, W.B.R....	M. M. 2	14-5	61-0	89-0	25-0	20-7	11-0	6-9	34	19	11	London
65	Spencer, C.G.....	M. iv a	13-8	61-2	102-0	26-1	21-9	11-4	7-5	36	22	11	Tetsworth
330	Stack, C.S.....	M. L. 1	14-1	57-6	106-0	28-5	21-0	12-0	7-6	40	19	18	Poona
192	Stedall, B.P.	L. iv	13-7	59-5	90-0	26-5	20-5	10-9	7-4	32	20	11	London
302	Thomas, G.F.W....	M. L. 2	14-7	61-3	95-0	26-2	21-3	12-5	7-5	42	20	11	Canada West
390	Thoyta, F.G.G. ...	M. L. 2	12-4	56-6	90-0	25-5	21-6	12-0	7-6	38	16	9	Cheltenham
189	Tribe, C.W.	M. iv a	14-2	58-5	81-0	25-5	20-6	10-5	6-8	—	18	12	Agra
582	Tuckett, P.D.....	L. iv	13-10	61-8	100-0	26-9	21-1	11-5	7-5	43	18	10	Bayswater
427	Wilson, H.E.	L. iii	11-6	55-0	75-0	24-0	21-1	10-1	7-0	28	18	8	Durham





REPORT
OF THE
MARLBOROUGH COLLEGE
Natural History Society,

(FOUNDED APRIL 9th, 1864),

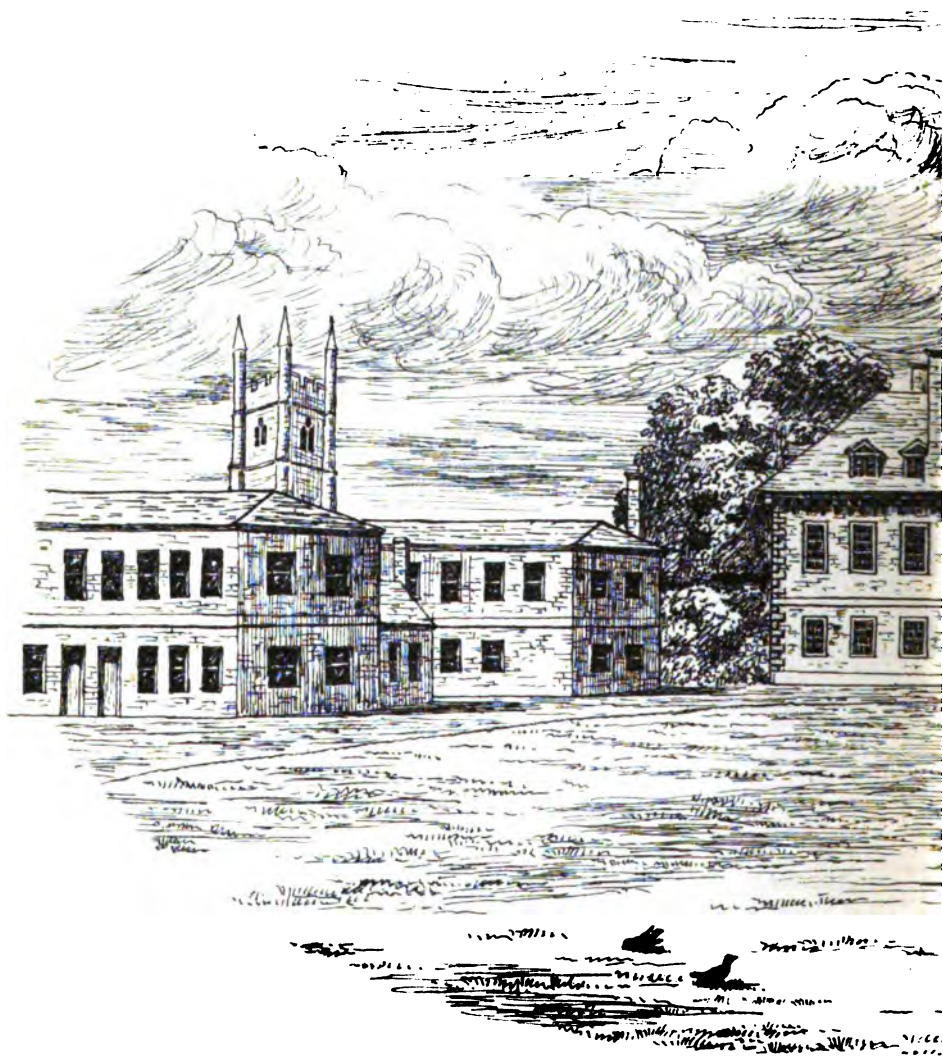
FOR THE
YEAR ENDING CHRISTMAS, 1883.

No. 32.



"TUM MIHI NATURE LIBEAT PERDISCERE MORES :
QUIS DEUS HANC MUNDI TEMPERET ARTE DOMUM."

MARLBOROUGH :
PRINTED BY CHAS. PERKINS.
1884.



REPORT

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Natural History Society,

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YEAR ENDING CHRISTMAS, 1883.

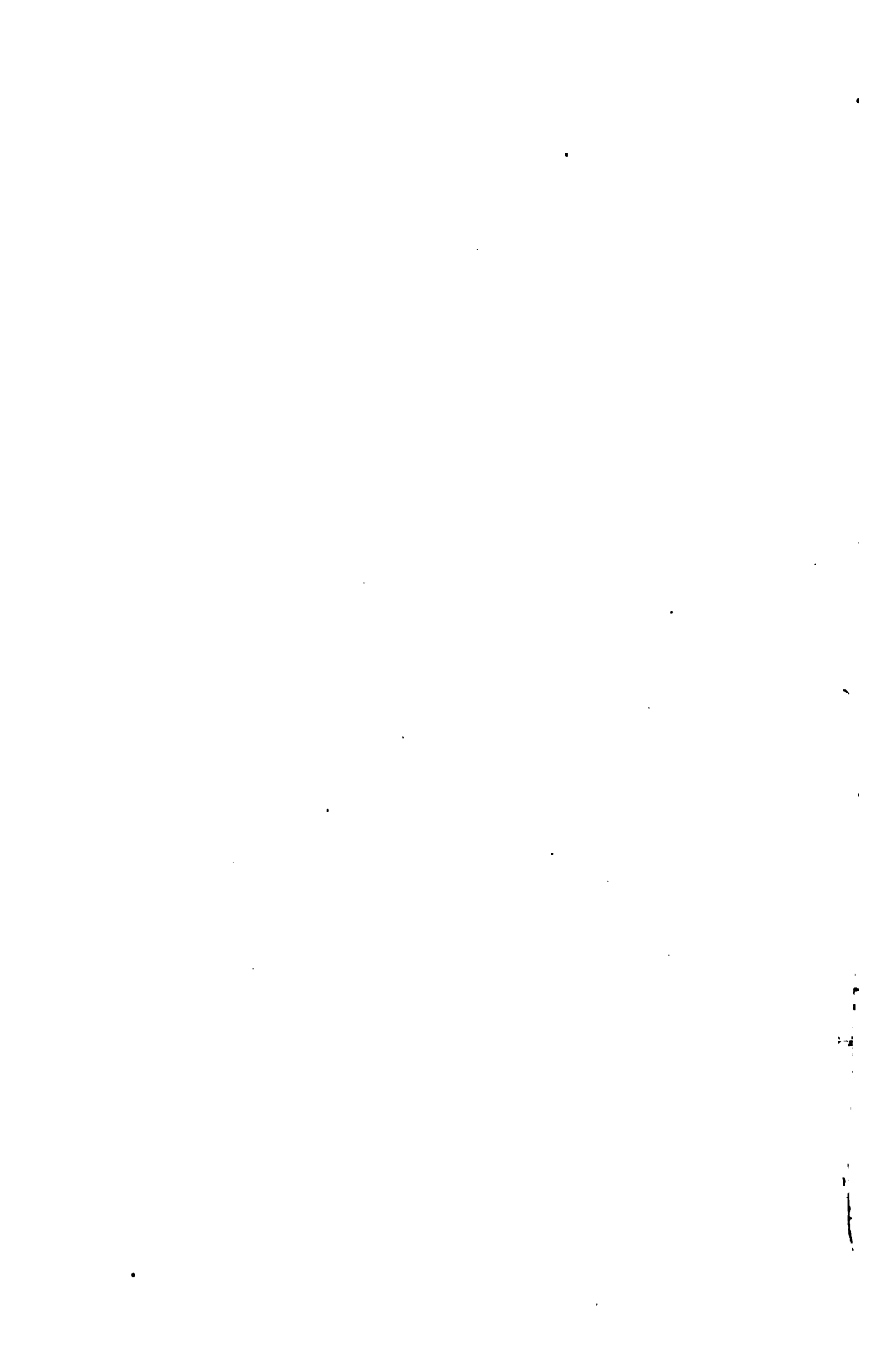
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1884.



THE Frontispiece was drawn by the Rev. W. J. V. Baker, and is taken from a water-colour sketch, now in the Adderley Library, to which it was presented by R. Few, Esq. The view represents the Old House, as it appeared when used as the Castle Inn, the site of B House being occupied by the stabling and offices. The original sketch was made by Mr. Nelson, the architect first called in by the Council to advise them as to the conversion of the existing buildings.

ERRATUM.

The view of Hertford House in the Report of 1882 was erroneously described in the Introduction as being copied from an old *engraving* in the Adderley Library. The so-called engraving is a pen-and-ink drawing, by the late J. R. Dummer, Esq., O.M., and is taken from a plate in Stukeley's Itinerary.

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P R E F A C E .

THE great fact in the history of the society during the year 1883 is the Museum. This time last year we could only speak in words of hope; these hopes have now been realized, thanks to the untiring energy of the Rev. T. A. PRESTON, who has devoted the whole of his time since April last to the selection, arrangement, and naming of the collections. What such a work entails can be known only to those who have had similar work to do; but our Museum, as long as it lasts, will be a standing monument to his zeal, scientific knowledge, judgment, and success. Having thus got our Museum in order, the great question now is how to make the best use of it. We have thrown it open to the school on Sundays after mid-day chapel, and the number of visitors has been considerable from the first. In addition to this, members of the society have had access to it almost any hour of the week while daylight lasted. But it is obvious that this is inadequate. Instead of being merely a pleasant lounging room, we should like to see it made the means of some real scientific teaching. With this object in view Mr. PRESTON is engaged in compiling a catalogue, which will we hope be in the press by Easter: and he has already written a Handbook, which is printed in this Report, and also published separately in the form of a pamphlet, which will show the principles on which the collections have been arranged. This Handbook will be invaluable to those who wish to work on their own account, and it is hoped that means may be found for making it in some form a part of the regular teaching in school.

The Library has been divided into two parts. The bulk of it has been placed in a book case in the passage outside the Museum, and from it members may take out books as usual. The books, which are more especially works of reference, and periodicals have been placed in the Museum, and facilities have been given for members to make use of them in connection with the collections.

The Museum.

The Library.

Donations.

The Donations this year have been unprecedentedly large. We have greatly increased our Zoological department, thanks to the liberality of the authorities of the British Museum, who have placed us on the list of Societies entitled to receive grants from them. Taking advantage of this offer, Mr. PRESTON has been enabled to select such typical specimens as he required to carry out his scheme. This is especially the case with the Fishes, in the choice of which he received the valuable assistance of Dr. GÜNTHER. Moreover, SIR JOSEPH HOOKER, K.C.B., Director of the Royal Gardens at Kew, allowed us to make a selection from the collection of European plants made by that indefatigable botanist, the late G. C. JOAD, Esq.; and consequently Mr. PRESTON has made a very useful and very beautiful addition to our Herbarium.

From private sources, too, we have been great gainers. We are indebted to J. WALKER, Esq., M.D., for the human skeleton, the crowning point, as the Hand-book will show, of our system. Mrs. BLAGG has given us a very large collection of shells from all quarters of the globe, which fill one of the most attractive cases in the Museum. W. F. H. BLANDFORD, Esq., O.M., has continued the assistance he rendered us here by making over to us his collection of beetles, in admirable order, and by revising the Entomological list, drawn up by E. MEYRICK in 1873, which will be found in this Report, and which can also be had separately. We have to thank Miss PRESTON for some exquisite models, in coloured glass, of Sea Anemones and Jelly-fish, &c., from the studio of HERR BLASCHKA, of Dresden, which for their beauty and novelty are bound to please. It is gratifying to know that this number is to be still further increased by the kindness of W. MANSELL, Esq.

The value of the Guiana collection sent us by E. F. IM THURN, Esq., has been greatly increased by the further donation of his important book, "Among the Indians of Guiana," on the appearance and reception of which we heartily congratulate him.

The Cabinet of Roman Coins has been put, as far as possible, into order by H. A. BULL, Esq.

Desiderata.

As our space is limited, and the Museum is arranged on a special plan, it is obvious that we shall be compelled to refuse, with regret, the offer of any donations that cannot find a place in our system. On the other hand there are many gaps that

require to be filled, and for the guidance of the many who, we are sure, are anxious to do us a good turn, we publish a list of the chief desiderata. It is naturally by no means complete.

The only section which has met regularly during the past year has been the Entomological one, superintended by the Rev. T. N. Hart-Smith; and in his department some work has been done. Mr. HART-SMITH's work with the microscope has also been continued with no small amount of success; and we hope before long to enjoy the fruit of what has been done in the shape of a "microscopical evening." There has been some playing at Botany and Geology, but since the departure of R.W. RICKARDS, no one has really taken up the study of the former with any earnestness. Ornithology has suffered seriously by the loss of G. T. K. MAURICE, but he has done a good work by the example which he set, and it is to be hoped that the influence of it will last. The telescope has not been unused, thanks mainly to L. W. BROWNE.

Sections.

The system of recording observations in connection with all branches of Natural History has been revived, not without good results. The number of contributors has been fairly large, and will increase we may expect with the spring. Here again G. T. K. MAURICE and L. W. BROWNE have been the most regular. Believing in the value of these observations, we publish a selection in the hope that other societies like ours may also make their records public.

Record Book.

For the Stanton Prize competition no candidates offered themselves in Botany, and only two in Entomology, W. L. WAINWRIGHT and E. K. CHAMBERS. Some careful work had been done by both, and the prize was awarded to the former. The conditions for this year's competition are somewhat novel, and we shall be disappointed if the number of competitors does not show some improvement.

Stanton Prizes.

A former member, to whom we already owe much, has been good enough to offer a prize for an essay on any subject connected with the work of the Society, with the special view of encouraging actual observation. It was awarded to E. K. CHAMBERS for a paper on "Insect Architecture," although the matter was not as original as the donor of the prize would have liked to see it.

Essay Prize.

The Rev. A. C. SMITH's great map of the Wiltshire downs has not yet appeared owing to numerous unexpected delays, which

Map of the
Downs.

only those who have had experience of publishers could believe to be possible; corrected proofs of the last sheet were in their hands early in January.

Lectures and Meetings.

The Report contains only one paper read before the Society. The reason of this is two-fold. Most of the lectures have been spoken, not written, and during the Summer Term we thought it best to discontinue them altogether. The only one that we have printed, by F. MADAN, Esq., O.M., on "Ancient Manuscripts," we most heartily commend to the careful study of all our readers. A *précis* also appears from the pages of the *Marlburian* of two lectures by DR. HUDSON and the REV. J. G. WOOD. Of the other lectures, the most successful was that given by W. F. H. BLANDFORD, with magic lantern illustrations. The attendance at the fortnightly papers has been fully up to the average. Perhaps the most encouraging feature of the year's work has been the wish expressed by the Society, that at least twice a term there should be a meeting for members only to discuss the contents of the Record Book, and examine donations. This wish has been carried into practice, and has proved a success.

Field Days.

The Field Days call for no special remark. They have supplied the means of spending several pleasant afternoons, but where the real workers are so few, it would be unreasonable to expect any great results.

On behalf of the Committee,

H. RICHARDSON,
President.

MEMBERS.

LENT TERM, 1883.

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E. N. Gardiner.

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F. E. Rowe

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H. L. Bell

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G. S. Back

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F. H. Hulme

G. T. K. Maurice

A. E. R. Mangles

A. G. Thynne

P. Horton Smith

B. S. Collett

C. S. Palmer

H. A. Clark

W. B. Silver

W. A. King-Harman

H. R. Cooper

A. B. Field

C. Stack

H. C. B. Foyster

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D. J. Tait

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L. C. Hamerton

H. G. Comber

E. A. Stanton

H. L. Stanton

R. Waddilove

A. L. Jackson

C. H. Lambert

T. H. Parr

P. M. C. Coats

F. J. Danvers

A. E. Rogers

W. H. Coats

W. R. McInnes

C. G. Spencer

R. W. Richards

W. A. C. Clowes

K. Rogers

W. L. Wainwright

C. G. Green

R. W. C. Carey

E. F. Benson

H. F. Darell-Brown

B. C. Waterfield

R. T. Michell

A. B. Jackson

P. M. Holloway

C. G. Chambers

G. H. Procter

76 School Members.

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H. G. Hills	B. Waddilove	W. B. Maurice
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W. B. Silver	A. M. Fairbairn	R. B. Maurice
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E. K. Chambers	C. G. Green	J. F. Fearon
L. W. Browne	H. F. Darell-Brown	R. F. Lascelles
H. V. Thomson	J. M. Harvey	R. N. Harvey
W. H. Rotheram	L. C. W. Bullock	H. B. Rickards
P. Horton Smith	A. Bell	E. D. Ross
H. A. Clark	S. H. Reynolds	J. O. Hickman
H. R. Cooper	G. K. Baskerville	H. G. H. Leveson
H. C. B. Foyster	E. P. S. Yeatman	H. J. Grummitt
A. P. Perceval	A. C. Hall	A. M. W. Mohun Harris
E. A. Stanton	A. B. Jackson	E. C. Dobie
W. L. Wainwright	G. H. Procter	W. B. Maurice
R. T. Michell	G. H. Bosworth-Smith	H. H. G. Stansfeld
H. W. Cholmoley	A. G. Thynne	R. B. Maurico
E. L. Procter	C. S. Palmer	H. M. Givcen
H. L. Bell	W. A. King-Harman	L. S. Etheridge
C. G. Chambers	H. G. Comber	H. Field
J. A. Hay	R. Waddilove	F. J. Boulton
H. G. Hills	C. G. Spencer	F. du P. Oldfield
A. F. E. Stiffe	A. M. Fairbairn	F. E. Nixon
A. B. Field	H. W. Edwards	W. Yeames
J. J. Wright	B. C. Waterfield	R. A. M. Ewart
L. C. Hamerton	R. W. C. Carey	G. B. Nicholson
H. L. Stanton	W. H. Sharp	W. K. Peake
C. H. Lambert	A. B. Wynne Willson	H. M. Barnes
F. J. Danvers	F. C. Webb Were	G. E. W. Money
W. R. McInnes	W. C. Lascelles	F. J. S. Neill
W. A. C. Clowes		

82 School Members.

HONORARY MEMBERS.

Rev. T. A. Preston	H. J. Verrall, Esq.
F. E. Thompson, Esq.	C. W. Bourne, Esq.
W. E. Mullins, Esq.	H. D. Drury, Esq.
Rev. J. Sowerby	Rev. C. Soames
The Dean of Westminster	H. P. Dixon, Esq.
C. M. Bull, Esq.	W. A. Clarke, Esq.
W. Fergus, Esq., M.D.	Rev. W. M. Furneaux
S. B. Dixon, Esq., F.G.S.	Rev. A. C. Smith
W. H. Macdonald, Esq.	J. B. Fuller, Esq.
W. Mansell, Esq.	H. E. Garrod, Esq.
J. F. Duthie, Esq.	Rev. The Master
G. H. Dawson, Esq.	W. W. Goodchild, Esq.
Rev. A. C. Almack	L. E. Upcott, Esq.
E. F. im Thurn, Esq.	W. M. H. Milner, Esq.
Rev. G. W. de Lisle	Rev. T. N. Hart-Smith
H. A. Evans, Esq.	Rev. J. P. Way
Rev. J. W. Mills.	H. Richardson, Esq.
W. W. Fowler, Esq.	Rev. C. W. Taylor
A. H. Beesly, Esq.	Rev. J. Papillon
F. E. Hulme, Esq.	H. B. Horner, Esq.
Rev. C. E. Thorpe	G. Sharp, Esq.
Rev. J. S. Thomas	G. W. Rundall, Esq.
Canon Farrar, D.D., F.R.S.	R. Alford, Esq.
W. P. Sellick, Esq.	F. Madan, Esq.
H. C. Spry, Esq.	Rev. W. J. V. Baker
G. F. Rodwell, Esq.	J. Bain, Esq.
W. D. Fenning, Esq.	B. D. Turner, Esq.
R. E. Price, Esq.	A. J. Bourdillon, Esq.

EXTRACT FROM RULES.

That Honorary Members pay 5s. a half-year, for which they shall be entitled to a copy of the Report.

That Honorary Members may compound for all future subscriptions by the payment of Three Guineas, and that past members of the Society may compound for six years on payment of £1, to be renewed at will.

RULES.

1. That this Society be called the Marlborough College Natural History Society.

CONSTITUTION.

That the Society consist of Members and Honorary Members.

OFFICERS.

That the Officers of the Society consist of a President, Secretary, Treasurer, Librarian, and Curator.

ELECTION OF OFFICERS.

1. That the President have the absolute power of nominating the Secretary.

2. That Common Room members of Committee, who are not ex-officio members, be elected triennially at the commencement of the Winter Term, and that the retiring members be eligible for re-election. Candidates for the Committee from the School must be nominated by the Committee and elected at the end of the term when the vacancy occurs.

3. That the Librarian and Curator be elected terminally by the Committee.

MANAGEMENT.

That the affairs of the Society be conducted by a Committee, consisting of the President, Secretary, Treasurer, and four other members of the Society, two of whom, at least, shall be members of the School, to be elected from and by members of the Society; three of whom shall form a quorum.

PRESIDENT.

That in case of an equality of votes, the President shall have a double or casting vote.

SECRETARY.

That the duty of the Secretary be to summon meetings (when necessary) of the Society; to keep a detailed report of the proceedings, as well as lists of Members and Visitors present at each meeting, and generally to act under the direction of the Committee in all matters connected with the welfare of the Society.

LIBRARIAN.

That the duties of the Librarian be to keep a catalogue of the Library, with the names of the donors, and to see that the Library Regulations are carried into effect.

CURATOR.

That the Curator be responsible for the order and tidiness of the Museum.

LIBRARY.

That any member of the Society be at liberty to consult any of the books belonging to the Society, but that certain volumes, to be decided on by the Committee, be not allowed to be taken from the room.

MUSEUM.

That only certain members be allowed access to the Museum at any time. Application for this privilege must be made to the President.

FIELD DAYS.

That the Field Days be confined entirely to members of the Society, and that the President appoint a day on which all names must be given in.

MEMBERS.

That the election of new members rest entirely with the President.

That every member pay a subscription of 2s. 6d. his first term and 1s. every subsequent term.

That members have the right to introduce one visitor at all general meetings of the Society.

This rule does not apply to the President and Secretary.

HONORARY MEMBERS.

That Honorary members pay 5s. a half-year, for which they shall be entitled to a copy of the Report.

That honorary members may compound for all future subscriptions by the payment of three guineas, and that past members of the society may compound for 6 years on payment of £1, to be renewed at will.

SUSPENSION OF MEMBERS.

That any member be liable to be excluded from the Society by the Committee, if in their opinion he shall have failed to show sufficient energy in the work of the Society.

SECTIONS.

That the Society be divided into sections, to be formed for the more accurate study of the different branches of Natural History.

That the question of the number of sections be left open for settlement at the beginning of every Term.

Attendance at the sections is compulsory, unless an adequate reason can be given for exemption.

Attendance at the sections excuses attendance at the general meetings.

NEW RULES.

That any member of the Society have power to propose any new rule or any alteration in an old one for the consideration of the Committee, provided the motion be seconded by another member.

Two weeks' notice must be given of any change proposed.

FIELD DAYS, 1883.

SATURDAY, MAY 6TH, NEW MILL.

As the continued cold gave but little promise for Entomologists the party only numbered 21. They lunched at New Mill, in a barn kindly placed at their disposal by Mrs. Jarvis, and met for tea on Olench Common. Though the sun was bright, the wind was chilly, and the Entomologists did nothing. The Ornithologists were fairly successful, though the only fresh notices obtained were the eggs and young of the Brown Linnet. There were also found two Hedge Sparrows' nests with eggs, one Blackbird's with 3 eggs, one Song Thrush's with 5 eggs, one Magpie's with 9 eggs, one Starling's, which was inaccessible, one Long-Tailed Tit's without eggs, and one Carrion Crow's nest, probably containing young birds, which circumstances saved from actual visitation. In the same gorse were found Linnets' nests, some just begun, some completed, some containing eggs in various stages, and one containing young birds. The most successful workers were G. T. K. Maurice, B. N. Harvey, W. B. Maurice, C. E. Cooper, and B. C. Waterfield.

Vegetation was singularly backward, and although some flowers were in abundance, only 94 plants were observed, as against 165 on May 13th, 1882, and 146 on May 10th, 1881.

SATURDAY, JUNE 6TH, SILCHESTER.

The day being a whole holiday in honour of Dr. Benson's appointment to the Primacy, a party of 27 members, with the President, visited Silchester, and Stratfield Saye; leaving by the new line at 7.20, Mortimer Station was reached at 10.20 after an hour's halt at Basingstoke. At Mortimer we were met by the Rev. H. G. Monro, Rector of Stratfield Saye, who, with the most considerate kindness, placed his large break at our disposal, and himself accompanied us throughout the day. A pretty walk of 2½ miles brought us to Silchester. Then, under Mr. Monro's able guidance, we made the tour of the walls, city gates, sites of the forum and various private houses, and the museum, and then dined on food we had brought with us, in the grateful shade of the old amphitheatre. After dinner, some in the carriage and some on foot, we got over 4 miles of well-wooded country to Stratfield Saye, where, by the kind permission of the Duke of Wellington, the house and grounds were thrown open to us, his Grace himself showing us the chief treasures of his Silchester collection, including a Roman eagle, and many very perfect gold coins. A pilgrimage to the grave of Copenhagen led us through a magnificent rhododendron and azalea garden, and made us wish for two hours more to wander in the park. After being most hospitably entertained at the Rectory, Mr. Foster, of the Railway Hotel, Mortimer, drove us back about 5 miles to Mortimer Station in time for the 5.7 train, and with another hour's halt at Basingstoke, we reached home at 8 o'clock.

SATURDAY, JUNE 30TH, BLACK BURNEY BOTTOM.

The party lunched at Stock Gorse, and worked back to Axford for tea. The day was warm and fine, and collectors were generally successful. Insects of all kinds were flying, and some good species were taken, including the small blue, the marble white, and many moths.

The Botanists discovered 214 plants in flower, 28 of which were notices for the year, and one or two rarities which have seldom appeared in our neighbourhood, such as the Hairy Hawk's Beard, a plant of naturalization. On July 1st, 1882, exactly the same number of plants were observed as this year, and on July 7th, 1881, as many as 250. The Ornithologists did little, but some eggs of the Goat Sucker were found laid on the bare ground.

SATURDAY, SEPT. 29TH, MICHAELMAS DAY, LUDGERSHALL.

On Michaelmas day, Saturday, Sept. 29th, as there was no School after 11, 33 members, with the President and Mr. Hart-Smith, proceeded to Ludgershall by the 11.49 train. They were fortunate enough to meet with the Rev. W. H. Awdry, who was good enough to take them past the relics of the once rich town cross, to his well-restored church, with its handsome tomb of a member of the Brydges family, and deep-splayed windows, and then on to the remains of the Norman Castle, standing within a well-preserved Roman encampment. After lunching in the waiting-room, kindly placed at their disposal by the Station Master, they walked two miles over the downs to North Tedworth, where the rector, the Rev. E. F. V. Williams, showed them his church, also carefully restored, and the gravestone of the famous Mr. Mompesson, mentioned by Pepys, and popularly believed to have been worried to death by the mysterious drum of the Tedworth drummer. Another mile took them over the county border into Hampshire, and to the exquisite church in Tedworth Park, close to Sir John Kelk's House. The wonderful beauty of its marble columns, its reredos, and windows having been pointed out by the Rev. H. E. Delmé Radcliffe, the party walked over Clearington Hill, to Sidbury camp, 2 miles, and then 3 miles to the Queen's Head Inn, Ludgershall, where tea occupied the time till the train started at 7.18. The whole walk was mostly over the downs, and the views over Collingbourne Woods, Andover, and Salisbury plain were very fine. 94 flowers were noticed in bloom, including the knotted spurry, and traces of abundance of rosebay willow herb on the top of Sidbury. On the Stonehenge expedition the same day last year, the flowers and grasses reached 180.

SATURDAY, OCT. 20TH, SWINDON.

A small party went over by train and worked in the Portland bed pits near the rectory, but found nothing calling for remark, though the ordinary fossils were in abundance.

MEETINGS.

LENT TERM.

THURSDAY, JANUARY 5TH, PRELIMINARY.

At this meeting it was decided to renew the Entomological sections, which would meet fortnightly in Mr. Hart-Smith's room, and the Botanical section, which would meet weekly at Mr. Preston's house.

THURSDAY, FEBRUARY 1ST.

G. H. DAWSON, Esq., O.M., gave a lecture on

SHOOTING,

in which the objections to the sport were candidly stated, and reasonably discussed, and the lecturer then went on to show that it was eminently a matter of skill and practice, and concluded with some practical hints.

The thanks of the meeting were expressed by M. E. Yeatman, Esq., O.M.

Present: Members, 31; School, 48; Visitors, 3; total, 82.

SATURDAY, FEBRUARY 17TH.

The REV. J. G. WOOD gave a lecture on

THE WHALE,

illustrated by masterly sketches on black canvas, a full account of which appears in this Report.

The Bradleian, as usual, was well filled.

THURSDAY, MARCH 15TH.

The REV. J. STILL, Rector of Netheravon, told the Society something of what he had seen during his

SIX YEARS' MISSIONARY LABOUR IN MELANESIA.

For any one fond of boating and the sea, the life out there seems to possess many charms over and above the interest in the work itself. The pictures of such a life were drawn so naturally and simply that one almost felt oneself being swept along in a hollowed tree-trunk by a three-man breeze, to land on some outlying island, and grin oneself into friendship and admiring embraces, or to be served up at a cannibal feast. Mr. Still exhibited cannibalism in a light probably new to most of us. The islanders practise it partly because they believe that the courage of the eaten man will enter into them, and partly because they believe that such an act will please the spirits of their dead chiefs; but such feasts are only held on great occasions, such as the opening

of a new boat-house, or the death of a great man, and are valued as perpetuating the memory of the event. One chief has substituted for a human meal the adoption of a girl from a neighbouring tribe. In connection with one of the questions of the day at home, it will be pleasing to some to know that on marriage the bridegroom is absorbed into the tribe of the bride. The Polynesian tribes differ very markedly from the Melanesians; but the origin of the families is uncertain. Migration as a rule in those parts would naturally follow the set of the trade winds and currents, and move from East to West; and it is a curious fact that the skulls found in our Wiltshire barrows are found to bear a close resemblance to the skulls of the present day of the people of the South Pacific, and of Africa.

In returning the thanks of a large meeting, the Master truly said that Mr. Still's apology for not having spoken more directly on Natural History was not required, for he had taught everyone there a great deal about one very important member of the animal kingdom, namely man.

There were present—Members, 81; School, 56; Common Room and friends, 12; total, 99.

THURSDAY, MARCH 29TH.

The meetings for the term were brought to a successful and appropriate close by

A LECTURE ON BEETLES,

from the Secretary, W. F. H. BLANDFORD, whose absence next term will be nothing short of a calamity for the Entomological Section, the members of which have learnt to lean absolutely on his guidance and experience and willing help. The Society owes him a great debt of gratitude for the stimulus which he has given to all the branches of its work, and if he had wished to enlist the sympathy of successors on behalf of his most recent hobby, he could not have chosen a better method than the lecture which he gave on Thursday. His skilful drawing combined with his careful study justify the hope expressed at the end of the meeting that he may re-appear on the scene here as a second J. G. Wood.

After explaining the structure of the insect by the help of drawings on the black-board, the lecturer showed a series of Magic lantern pictures, photographed on to glass by Mr. Baverstock, all prepared by himself, to exhibit types of the different families of beetles.

The execution was so admirable and careful that the drawings lost nothing by being magnified, and each one was explained with such simplicity, raciness, and power that one felt one was listening to a master of his subject. It was an evening of which the lecturer and the Society have reason to feel proud.

After expressing the thanks of the meeting Mr. Preston exhibited a gigantic plate of baleen, or whalebone from a baleen whale, and then explained the mechanism of his type writer.

There were present—Members, 24; School, 31; Common Room and friends, 6; total, 61.

The cases in the New Museum are now nearly complete, and the transfer of the collections into them will shortly begin. The arrangement of the Roman coins has been kindly undertaken by H. A. Bull, Esq.

SUMMER TERM.

THURSDAY, MAY 3RD. PRELIMINARY.

E. N. Gardiner was appointed Secretary in the place of W. F. H. Blandford, who has left, and G. T. K. Maurice was elected on the Committee. Mr. Preston agreed to continue his Botanical section, and Mr. Hart-Smith the Entomological one. It was decided to have only two general meetings this term, on the supposition that members' time would be occupied by work out of doors.

THURSDAY, MAY 10TH.

G. F. RODWELL, Esq., read a paper on

VOLCANOES.

After explaining the general nature of the phenomenon connected with them, the lecturer gave some account of the chief volcanoes, most of which he had himself personally visited. The paper was illustrated by diagrams, maps, and magic lantern slides.

The thanks of the meeting were expressed by M. H. Gould, Esq.

Present: Members, 37; School, 48; Visitors, 2; total, 87.

THURSDAY, MAY 17TH.

The PRESIDENT gave a lecture on

SPAIN,

which was illustrated by magic lantern views of Cordova, Grenada, Toledo, and other cities.

The thanks of the meeting were expressed by the Master.

Present: Members, 29; School, 37; Visitors, 12; total, 78.

WINTER TERM.

THURSDAY, SEPTEMBER 28TH. PRELIMINARY.

C. H. Roberts was appointed Secretary in place of E. N. Gardiner, who has left, and E. F. Benson was elected on the Committee. A large number of donations were exhibited, including a case of implements from the lake dwellings of Switzerland, from M. Grellet; some flint arrow and spear heads from Italy, from E. Lloyd, Esq., O.M.; very fine specimens of the Echidna, duck-billed Platypus, and several birds from Victoria, from F. C. Webb-Ware; and a Tiger's skull from E. A. Stiffe.

In consequence of the lengthened discussion arising out of these donations, it was decided to substitute for the future a similar meeting for at least one of the regular lectures; and on the suggestion of G. T. K. Maurice, to place a book in the Museum to contain the record of any observations of any kind in connection with the work of the Society.

There were 32 Members present, the School not being admitted.

THURSDAY, OCTOBER 14TH.

The REV. T. A. PRESTON explained the system on which the
New Museum

had been arranged, and how, by following the cases in a particular order, the visitor passes from the lowest forms of animal life to man himself. The limitation of space required that the collections should be for the most part merely typical, and consequently all the greater care was necessary in the selection of specimens; where actual specimens were out of the question it was proposed to supply their place with models, or photographs.

The thanks of the meeting were expressed by Canon Houghton.

Present: Members, 30; School, 32; Visitors, 10; total, 72.

THURSDAY, OCTOBER 18TH, PRIVATE.

30 Members were present.

Amongst the donations a Map of Wiltshire, published in 1610, and presented by the Rev. W. J. V. Baker, was exhibited, as also a large and varied collection of articles from South Africa, lent by W. E. Mullins, Esq. Notes from the observation books of the Society and Entomological Section were read and discussed.

SATURDAY, NOVEMBER 3RD.

DR. HUDSON

gave a Lecture, illustrated by his well-known illuminated diagrams, on

THE ROCK POOLS OF DEVONSHIRE,

a full account of which will be found in this Report.

There were about 200 persons present.

THURSDAY, NOVEMBER 15TH.

On Thursday, November 15th, a paper was read in the Bradleian, by F. Madan, Esq., O.M., Sub-Librarian of the Bodleian Library, Oxford, on Ancient Manuscripts. Taking a particular MS. of the XVth century, the lecturer enlarged and explained the Latin terms used in its description such as codex, folio, and membrana. The interest with which his words were followed would have been even still further increased, if the audience had known what they knew at the close of the evening, that this particular MS., a very beautiful Horarium or Book of Hours, with admirably preserved illuminations and initial letters, was by the kindness of the lecturer the property of the School. It now forms one of the chief attractions of the Adderly Library.

Mr. Madan devoted the second part of his paper to an explanation of the various ways in which errors arise in the process of transcription, and the principles on which such errors are corrected, and illustrated these principles by apt examples from the Aeneid. What would have been of itself clear and intelligible, thanks to the mastery of his subject which the lecturer possessed, was rendered doubly so by a valuable printed syllabus. Mr. Madan, concluded with some humorous instances of "conscious" errors, which have produced the pathetic myth of young Mepati, and the eminently sensible lines: "stones in the running streams, sermons in books, and good in everything." We have seldom listened to any paper which was capable of being remembered and reproduced more easily.

Had Mr. Upcott, who expressed the hearty thanks of the audience, known all their sentiments, he would have added that the feeling uppermost in their minds was the hope that Mr. Madan would regard his treatment of the subject as incomplete, and afford them at some future time another hour as enjoyable as this.

Present: School, 53; Common Room and Friends, 14. Total, 67.

THURSDAY, NOVEMBER 29TH.

E. K. CHAMBERS,

a Member of the Society, read a paper on

INSECT ARCHITECTURE,

illustrated by drawings.

Present: Members, 12; School, 6; Visitors, 5. Total, 23.

WHALES.

BY THE REV. J. G. WOOD, SATURDAY, FEBRUARY 17TH.

We marvel, when we behold without knowledge, but in Natural History wonder is never diminished by closer acquaintance. There can be few to whom the whale does not afford some scope for flights of imagination, but none can have heard the results of modern investigations into the structure and habits of this 'hugest of living creatures,' on which the Rev. J. G. Wood lectured to a large audience in the Bradleian on Saturday, the 17th, without feeling his wonder and interest greatly increased. We admire the beauty and minute perfection of microscopic life; we are awe-struck when we think of Leviathan, that on the deep

Stretcht like a promontory sleeps or swims
And seems a moving land, and at his gills
Draws in and at his trunk spouts out a sea.

But while the first feeling is a delight of modern science, there has hung in all ages a halo of romance around the giants of the sea. Not only have sailors given free rein to fancy on the subject of whales, their power and speed, their bellowings and 'breachings' when they spring clear out of the water, and told endless legends about their congeners, the Manatee and the Dugong, which literally 'graze the sea-weed their pasture,' and are truly the cows of the sea, rather than the mermaids of old story; but science herself has had her sedateness sorely tried to set at rest the innumerable incongruities suggested by the Cetacea, and in the scantiness of accurate information to dispel the false theories about them.

How can there be creatures inhabiting the ocean, far above the fishes in the scale of creation, viviparous instead of spawning; warm blooded and therefore breathing atmospheric air not by gills, *pace* Milton, but by lungs; capable of being drowned, yet able to remain for upwards of an hour at depths where the pressure of the superincumbent water is almost irresistible; with all the attributes of the Mamalia both in habits and structure, yet at home in the waters of Arctic or tropical Seas, and suited for such apparently adverse conditions?

Mr. Wood in his interesting lecture, the third he has delivered here, showed us by help of his inimitable diagrams with coloured chalks and canvass, how simply and beautifully this problem has been solved in all the whale tribe. This is a larger class than is generally supposed, containing the Dolphins and Porpoises, the Narwhals or Sea-Unicorns, the herbivorous Dugongs, and above all the two prominent species of whale, the Cachalot

or Spermaceti Whale and the Balæna or Whalebone-producing Whale. Seals and Walruses are also Mammals, but belong to the amphibious class, and take a higher rank.

The Sperm-whale is not an animal of artistic proportions, or to be meddled with on inductive principles. Its head is nearly one-third of its whole body in size; the lower jaw small in comparison and covered with teeth, for catching and crushing against the grooves into which they play, the cuttle-fish and other slippery customers which their owner loves: the eye is small, placed not on man's but on Nature's principles of beauty, behind the mouth and slightly above it; the ear is just large enough to admit a knitting-needle, and yet none too small for hearing in such a dense conducting medium as water; the skeleton consists of skull, a column of nearly 60 vertebræ and ribs enclosing the cavity of the heart and lungs; it appears small in proportion to the creature's bulk, and lies low entirely beneath the water-line, rendering it almost impossible for man to wound the vital organs. The legs are wanting, except the rudimentary bones of the pelvis; the 'flippers' are but modified forelimbs, exactly corresponding to our arms and hands in the details of their anatomy; the tail is a powerful instrument of propulsion, set horizontally to the axis of the body. But more curious still are the nostrils or blowholes, the position and number of which serve to distinguish different species. The Manatee has a snout with nostrils of the usual type; some species have a single blowhole: but the larger Cete have two apertures situated more or less forwards on the surface of the head. A passage communicates with the lungs, provided with peculiar bag shaped valves to prevent the forcible ingress of the water at great depths, similar to those in the throat of crocodiles. The ear passages also open into them, so that they afford means of both hearing and respiration. Clouds of mucous vapour, probably often mingled with sea water, which instead of assuming the conventional likeness to fountains, too surely reveal to a practised eye the species of whale according to the shape they assume, are forced out of the lungs high into the air, when the animal is busy storing his 'sanguinary reservoirs' with aerated blood, sufficient to enable it to undergo long submersion. These reservoirs are a marvellous provision of nature, a network of closely packed blood vessels, whose capacity may be estimated by the fact that an unwary inquirer was once nearly suffocated by slipping into a Whale's aorta, a section of which resembles a large hoop.

Still more marvellous perhaps are the means of protection against cold and pressure. In the obvious unsuitability of hair or fat, the whole surface of the body is padded with an underlying layer of elastic oil containing cells, the blubber so valuable to man, which is from a foot to eighteen inches

thick according to the species. And the head is not only shielded by a buffer of cartilage in case of rough contact with icebergs, but owes the bouyancy which prevents the swamping of air passages to an enormous cavity containing a liquid blanket of sperm oil, which is dipped up as from a literal well. Spermaceti is used in medicine, and also provides a material for the manufacture of candles equal to wax. Ambergris, another valuable whale product, is found in varying quantities in the intestines, and is even thought to be a morbid symptom.

The appetites of these creatures must be considerable, when we read that a man might easily descend the gullet of a spermaceti whale.

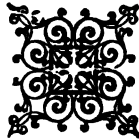
The baleen-whale has only a small gullet, but it makes up for this by the possession of a mouth which will engulf a ship's jollyboat full of men. These creatures inhabit the North Arctic seas, while the cachalot is now generally confined to Southern waters. It is mainly in the shape of the head, and the character of the teeth and therefore of the food, that the two species differ. The Northern Whale feeds on minute molluscs and medusae, which it catches by aid of its extraordinary sieve-like teeth, or plates of so-called Whale-bone or baleen. It dashes open-mouthed through acres of its prey. These plates, armed with stiff hairs and many feet in length, while letting the water pass, detain every victim to be swept downwards by the action of the tongue.

The whale fishery is attended by great dangers, but is very remunerative, the value of the products of one Whale amounting to many hundred pounds. Were it not for the necessity of rising to take in air, a lengthy and noisy process, man could hardly kill these creatures. The harpoon is but a pin which administers a harmless prick, and a crafty whale which has once escaped never makes the mistake of diving, but bolts and is soon only a memory. Savages cannot kill them: the possession of a whale's tooth is a *casus belli* among barbarous and vain potentates. When exhausted however by submersion they roll over on their sides and expose their vulnerable parts. It is hard to realise their size. A great whale-killer, who had slain over 300, found none of them exceeding 60 feet in length, and it is feared that their size and numbers are fast decreasing, but they have been known to reach 90 feet, and certain species of rorqual even 120 feet. No one who saw it will forget the lecturer's sailor drawn to scale, a veritable pigmy, or Gulliver in Brobdingnag.

There are many points of which the lecturer spoke which we would fain recount. It is a treat to recall the minute knowledge and graphic hand, to which the Natural History Society is so much indebted. It is only sad to feel that even when whales are being discussed there is a period of the evening when it is impossible to resist the claims of sleepy nature, and on

learning that the subject was not half concluded we wished in preference to more just then, to attend spirit-like at some future lecture soon to be given beyond the Atlantic, where we wish Mr. Wood full reward for his enthusiasm in spreading the knowledge of these ocean monsters.

F.



THE ROCK POOLS OF DEVONSHIRE.

BY DR. HUDSON, SATURDAY, NOVEMBER 3RD.

'Stores of ignorance,' in words that Dr. Hudson quoted, are indeed a possession of which we can all claim a very ample share; but few of his large audience on Saturday last, can have listened to his interesting description of the fantastic creatures that inhabit the rock-sheltered pools along our coasts, and seen in his striking and original illustrations their weird forms and marvellous colouring, without feeling that his private stock of that commodity was unpleasantly large. Walter Bagehot has said in his *Studies*—and it is a charge often laid at the door of Natural History—that scientific people are commonly dull people, devoid of broad human interests, men of limited sympathies and engrossed in rather uncanny pursuits into which few can follow them. This feeling is at the root of all thoughtless contempt for scientific tastes, and evidence may doubtless be found to support the fact. But those who have once felt the absorbing interest of a study of Nature, will be greatly pained thereby, and should anyone in a spirit of athletic pity wonder at the cause of this, he will scarcely continue so to do after hearing Dr. Hudson's lecture, unless he be not only placidly content with his own stock-in-trade, but also affects to despise in others all discontent with theirs.

The lecturer began by introducing his hearers to a rock-pool, such as we may see in hundreds at Ilfracombe, or Bude, tenanted by myriads of strange beings, and clothed in many cases down to dark blue depths with a magical forest of sea weeds and coral-like growths. It would be impossible to describe one tithe of their wonders, and as we gazed on a long series of such choice beauties as Dr. Hudson selected to describe, we felt how little of the lecture could be reproduced in a short article for the benefit of our readers. Its main subject was the interesting group of the Polypes. These strange creatures belong to two widely different orders. There are some which exhibit a high stage of development, and in whose internal structure a considerable differentiation of organs is visible, resembling that of the large order of Molluscs. These are the Polyzoa, so called from their tendency to form clusters or colonies of different kinds, composed of great numbers of separate horny sheaths or cells, each containing a distinct individual, but either united at their bases, from which they spring by a process of budding, or connected together by a creeping stem, which supplies them with a corporate life, and often assumes a beautiful tree-like structure, on which the units stand like veritable marine flowers. There are also the Zoophytes proper, though the name has been given to all the group, which exhibit a similar love of colonization,

but which, as in the common fresh water Hydra, present a far lower type of structure, and are not above being subdivided, cut in pieces, or even turned inside out, without apparently suffering in the least therefrom, even condescending to multiply indefinitely in the process. Some of these latter inhabit beautiful transparent cases, from which they thrust out their ring of whirling tentacles ready to catch and devour any unhappy victim. Nor is there any escape. These fleshy arms are thickly studded with little warts each containing a deadly dart, which readily pierces any soft body, and seems to paralyse all further action. They can even pierce the human skin, as any one knows who has ever taken a dip amongst a shoal of Jelly fish, creatures similarly provided. In the higher group these tentacles are clothed with delicate cilia or hairs which ever swaying to and fro maintain a constant current in the water, and bring the prize unflinching within the animal's grasp. Several species possess also a strange appendage, the peculiar form of which gives its name to the Bird's Head Corallians. Imagine a delicate arborescent growth, studded along its branches with innumerable flowers, which as they expand their blossom of tentacles, present just beneath these an organ like nothing but an avian bird's head, which keeps snapping and working its beak, often grasping its neighbour in default of something better. The object of this strange provision is uncertain; but it has been thought to be of use in seizing marine animals, whose decay may attract the swarms of animalculæ on which the polype loves to feed. Another strange sight, not commonly seen however is a kind of parasite—for even Polypes are not exempt—Coryne by name, where the principle of division of labour is apparently—for it is not certain—carried to its ultimate limits. Wheeling and playing about on the tube to which they are attached are bodies of two distinct forms, and while one division catches the needful prey, the other kindly monopolises the consumption thereof, digestion by proxy being thus amicably arranged.

It would take far too much space to speak of the Sea Slugs, their voracious habits but neither repulsive nor ungainly forms, and their strange combination of liver and lungs in festoons attached around their bodies, or of the beautiful Rosy Featherstar and its delicate arms; or again of the Cydippe, resembling a globe of prismatic colours, paddling through the water with its long spiral filaments. But we must not omit a word on the Medusæ. The common jelly fish is but one out of countless hosts of these creatures, inhabiting the ocean in all forms and sizes. They were long thought to be distinct organisms. They have been proved, however, to be but stages in the life history of one organism, very much as the caterpillar and chrysalis are but stages in the life history of the butterfly. Volumes might be written on the mode of reproduction of the Polypes, but they exhibit in many instances the strange phenomenon known as the Alternation of Generations. Either by a process of budding or

in separate cells the germs of the future Polypidom are developed. But these generally issue not as true Polypes, but as free swimming Medusæ, or bell-shaped creatures roaming at large and armed with tentacles for catching their prey. These Medusæ in turn lay eggs, and these grow into the Polype colonies: so the mother is like her sister or her granddaughter, but the daughter is totally unlike its parent. We have not done more than touch upon much that the lecturer told his hearers.

The charm of Dr. Hudson's lectures is that he tells us what he has seen himself. He strips the subject as far as possible of all technicalities, and gives his audience pictures and descriptions of scenes that have afforded him infinite pleasure in the pursuits of leisure hours. We must not suppose, when he invites us to try to taste of the same fountain, that it is all as delightful and easy as when we sit and listen to him. Nothing is ever achieved without steady work, and in science especially to make a start is the hardest thing. But this is half the battle, and as in few other things success is certain in proportion to the trouble taken. If only the lecturer could have transported his audience direct to the side of some marine treasure-house at Ilfracombe, we are afraid the denizens thereof would have had a poor time of it. Without Dr. Hudson we feel they are most likely to get off scot free, but let us hope at least that he has done them a very bad turn, and that when next summer comes round, not a few will be curious enough to dip into the mysteries of some sea-washed pool, and having begun will repeat the process.

F.



MANUSCRIPTS, THEIR KINDS AND PROPER USE.

A PAPER

Read before the M.C.N.H.S. on Nov. 15th, 1883, by F. Madan, M.A., a
Sub-librarian of the Bodleian Library, late Fellow of Brasenose College,
Oxford, an Old Marlburian.

The subject of Manuscripts is not one of which the importance has passed by. We who live in the XIXth century are apt to forget that printing is comparatively a modern invention. The first book printed with moveable types cannot be assigned to an earlier date than 1450 A.D.: so that for every record made before that date, whether of history, literature or science, we are solely dependent on manuscripts or inscriptions. In other words the record of all the masterpieces which the world had produced before the middle of the XVth century has been transmitted to us by the pens of copyists, sometimes ignorant and inaccurate men and in all cases subject to the peculiar kinds of error which affect work done by human hands and not by machinery. If in addition it can be shown that the study of Manuscripts is no simple matter, to be mastered by a light effort, but one in which there is need of learning and skill and above all of judgment—then there is nothing wanting to establish the claims of the enquiry on our attention.

The class of record included under the term Manuscript is not quite so easy to define as might be thought. The strict meaning of the term—manuscriptum—"what is written by hand," does not appear ambiguous; and most of us would agree in marking off as outside our scope all writing that is graven on stone (inscriptions) or cut in wood (carvings of any kind) or stamped in clay (as are the baked tablets of Babylonia). Yet some authorities use the word Manuscript loosely to include some or all of these, and it is also the fact that the science which specially treats of the decipherment of manuscripts—namely Palæography—finds similar material in these other kinds of writing: but at any rate there need not be any ambiguity in our narrower usage of the term this evening, as comprising ordinary written record.

The plan which it is proposed to adopt will divide this paper into two parts: in the first we shall take a full description of one particular MS and examine closely certain parts of that description, by this means considering in turn the chief external points of the book. In the second part we can

touch on the errors and defects which we find—it may be said necessarily—in all records copied by hand. And to make the matter clearer we will treat these errors in direct connexion with particular cases of them.

Let us take the description which is given on the printed paper which has been distributed (see Appendix to this paper): and—in deference to long usage in these matters—let us consider the Latin form, of which the English is a translation.

Even the first word may occupy us a while: for if we take the common Latin words which can signify a book in a particular order—*liber*, *codex*, *membrana*, *papyrus*, and *charta*—we obtain a list, probably in chronological line, of the chief substances which mankind has used to write on. *Liber* is the inner bark of a tree, and on this soft substance we may conclude that in prehistoric times letters or symbols were scratched with some pointed piece of metal or even, it may be, written by the use of paint or ink. The next word *codex* or *caudex* means properly the trunk of a tree—which is not a very promising writing material. But its derived meaning is a collection of small boards of sawn wood fastened together, recalling us to a time when letters were scratched on a film of wax spread over the surface of these tablets of wood. Our word “code” shows that these tablets were regarded as the most durable material on which to write the unchangeable laws or code of a community. *Papyrus*, our word “paper” but *not* our substance paper, is, as every one is aware, an Egyptian reed plant, the inner coatings of which readily take ink. This plant was unfortunately plentiful and easily prepared, but is a most treacherous material, becoming fragile when thoroughly dried by the lapse of years and often making the modern palæographer despair as he contemplates a mass of dry fragments, covered indeed with precious marks and letters if they could only be joined together, but as they lie before him resembling a broken heap of withered leaves. In complete contrast to this is the substance on which almost all our most precious Manuscripts are written, *membrana* or parchment, which is simply the skin of animals dressed and rubbed smooth with pumice stone. Unluckily parchment, and much more vellum, has always been infrequent and expensive. Last comes the word *charta* the paper of modern times, formed at first from cotton but now from linen rags.

In octavo again is not a quite simple phrase: for it has a different meaning, when applied to a manuscript or early printed book, from the modern one. We still speak of a folio or folio book, a quarto, an octavo and a duodecimo: after that indeed our Latinity fails us, and we speak in a sadly unscientific way of a 16mo, 24mo and 48mo. But by all these we simply indicate *size*, disregarding the real *meaning* of the words which have no necessary connexion with size at all. The best way to understand the

terms is to take any ordinary book and turn over the leaves until we find one where a thread runs down the page in the extreme inner margin. Mark the page and turn over the leaves again until you find the next thread, usually an interval of eight leaves (sixteen pages), in which case the book is an octavo. Now each thread marks the middle point of what is called a *gathering* or *sheet*, and of course the half-way point between the threads marks the place at which one gathering ends and another begins. But we are not entirely left to this calculation in order to detect the limits of the gathering: for on the lower margin of the first page of each one you will find a small letter of the alphabet which helps the binder to arrange the book. If you were boldly to cut to pieces the book with a knife at the end of each gathering, you would find the volume made up of a number of separate gatherings, each as a rule containing sixteen pages. If the book has the pages *uncut* you can unfold each of these divisions into one large sheet with the pages thus distributed:—

On one side.

9	21 6	8	
4	13 16	1	

On the other.

4	01 11	9	
2	15 14	3	

The book is called strictly an octavo when the whole sheet is folded (as above) to form *eight* leaves, a *quarto* when it forms four leaves (eight pages), and a *folio* when it forms two leaves only. These are the only proper meanings of the terms, and you see that they have reference only to the folding and not to the size of the sheet. But as it was convenient to have the whole unfolded sheet of one standard size, the early octavos in size are generally octavos also in folding, and only in the last two centuries has there been a disregard of the proper uses of the terms. We come back therefore to the fact with which I began, that the words octavo, quarto and the like *now* indicate size only, but in reference to manuscripts indicate the way in which the sheets which form the volume are folded into gatherings.

Let me now show one use of these facts. It is nothing less than this: you may tear a parchment MS. almost to pieces, separating nearly every leaf and destroying some of them: and yet that MS. can in many cases be put together again by an almost mechanical process. Let me explain. You must bear in mind what has been said about the formation of gatherings, and also this additional fact, that while paper is usually the same on both sides,

parchment, on which as I have said our most valuable MSS. are written, is not. The skin of which parchment is made even after rubbing and scraping is always darker and rougher on the outside where the hair of the animal has been, and lighter and smoother on the inside. Again sheets of vellum differ greatly from each other in colour and fineness. Now suppose a gathering of MS. has been injured and separated into single leaves: if you put together all the above considerations and use your ingenuity you will be able to do a great deal towards placing all the leaves in their right order.

Foliorum 130. This requires no explanation, and only the remark that MSS. are by usage not paged but foliated, that is to say numbered on each leaf only. Of course a book has twice as many pages as leaves.

Date of the MS. The settlement of the date of a MS. from a simple consideration of the volume itself is the great test of the skill of a palaeographer. Very few MSS. it must be remembered bear any record whatever of their writer, place of production, or date. Men like Mr. Maunde Thompson of the British Museum or the late Mr. Coxe of the Bodleian could in five minutes from simple inspection assign any MS. later than 1000 A.D. to a specific period of 20 years, and earlier ones to "within 25 years" of a given date.

The principles which settle a date are rather of interest than importance to my present audience, but as they throw light on the kinds and uses of codexes and belong to a kind of secret art it may be interesting to mention a few.

A palaeographer with an unknown MS. before him will consider first the character of the writing itself, then the paintings and ornamentation, and lastly the external form and make of the volume. Of course the subject of the record may itself give a clue: a MS. of Dante will not be earlier than about 1300.

As to the writing—there is a great division into two kinds. If a book is written entirely with capital letters (known as *uncial* writing) it will date from before 900 A.D.: if it is written in a flowing hand in which the letters run into each other as in all modern handwriting (*cursive* as it is called), it will be later than 800 A.D. Again take a Greek MS.: if the breathings (rough or smooth) be always formed of two straight lines meeting in a point, the writing is earlier than 1100 A.D.: if, as now, the breathings are throughout denoted by rounded comma-like curves, it is later than 1200. In general the more simple, upright and unabbreviated the writing is, the earlier is its date. With respect to the paintings and ornamentation of a book, each country and each century, it may be said, have their characteristics: and besides the important distinctions of style, the manner of depicting the human face, the use of perspective, the blending of particular colours

and such like, it is possible to lay down purely empirical rules, such as that if there be a large initial letter entirely of green it is earlier than 1800 A.D., and if there be rows of small dots surrounding an outline it is early Irish work. Still artists and scribes are not peculiarly exempt from eccentricities, and it is only by a convergence of several considerations that we can with confidence assign a special date in these enquiries.

The second part of this paper is concerned with the right use of manuscripts. That there is a right and a wrong use is due to the fact that no manuscript exists which is free from depravation. At first thought one may not see the difficulties which arise in the transmission of documents to modern times. Let us try to realize the state of the case. When Virgil, or rather Varius and Tucca, issued the *Æneid*, it was in the form of a single written volume representing faithfully what the author intended to make public. This would of course be copied for the sake of friends and those who wished to buy the poem, and these copies, as they became worn, would be again copied, until we come to some of the MSS. which still exist and can be seen and collated in our great libraries. Why then should we hesitate and doubt about what ancient authors wrote? Why should so much of the time of our scholars be occupied with what is called textual criticism? One consideration may precede the twofold answer to these questions: namely, that in many cases the difficulties connected with the text, and their importance, are greatly exaggerated, the points in dispute affecting perhaps one in one thousand words, so that for all practical purposes of literature and science we have what the authors wrote. When John Mill brought out his great edition of the Greek New Testament in 1707 with many thousand variants from the text, which he had found in his MSS., sceptics used it as an argument that the whole New Testament was untrustworthy in consequence of the number of variations. The real result of this comparison of varying testimony has been, as every one is aware, to make the sacred text doubly and trebly secure. But two reasons can fairly be given for the existence of textual difficulties: first that the great catastrophes of history—such as the burning of the Alexandrian Library, the invasions of the nations which overthrew the Roman Empire, and the taking of Constantinople by the Turks—account for the entire disappearance of many great works and the hopeless mutilation of many more, so that we have to piece together scattered quotations and references: while lesser accidents have contributed in their degree to the same result. But by far the most important reason is that man is not, cannot be, and will not be a machine: he insists consciously or unconsciously on asserting his freewill, as well in his more mechanical work, such as copying records, as in the sphere of conduct or thought. Wherever human work is, there will be an element of caprice and accident, the unaccountable

and the incalculable. We may remember the case of the poor Chess automaton—that perfect piece of mechanism as was supposed, which played Chess with the precision of clockwork. Everything depended on the boy inside acting like clockwork, slowly silently and mechanically, so that no one should suspect his presence. Alas! *Naturam expellas furca tamen usque recurret*. Some chuckle-headed wit formed the idea of scattering some pepper over the machine—the result of which was a portentous sneeze from its inmost depths! The fact which concerns us is simply this, that no scribe has ever copied a document of considerable length without some distinct depravation. If any of the School here present really doubts it, I should like to set him an imposition of a hundred lines, to write out. I'm not at all sure that he would do them, but if he did, I would engage to find at least ten errors in his transcript, ten points in which he has made his author say something which he did not say.

What will now be attempted is a classification of these errors, not only according to the immediate causes of them (the first part of the printed paper) but according to the method of correcting them (the second part). And some examples will be given from the text of Virgil. It may be mentioned that the two books which are so well attested by numerous and correct MSS. that they stand alone among ancient books as requiring no conjectural emendation, are the New Testament and the *Æneid* of Virgil. If the latter can afford us examples of every kind of error we can imagine in what state less favoured authors are. The aim of a scholar in his use of manuscripts is, in brief, to undo all the injury done by human errors and to reconstruct what the author originally wrote.

[The following scheme of principles and examples was explained and expanded by the lecturer: but any good commentary on Virgil will make it sufficiently clear. It must be understood that the examples are introduced to *illustrate some one principle*: no attempt is made to show how the application of several principles to one example may modify the result of applying a single principle to it. The lecturer expressed his belief that in II. 5 (example) *traicit*, *i* would account for all the variants].

MANUSCRIPTS.

I. CLASSIFICATION OF SOURCES OF ERROR IN TRANSCRIPTION (Chiefly from Hammond).

A. *Unconscious.*

1. Errors of sight.
2. " " hearing.
3. " " memory.

B. *Conscious.*

1. Incorporation of marginal glosses, or of various readings.

2. Correction of apparent difficulties, such as unusual forms and expressions, contradictions, or incomplete quotations.
3. Deliberate falsification, such as a change of the text for dogmatic reasons.

II. CLASSIFICATION OF THE PRINCIPLES ON WHICH TRANSCRIPTIONAL ERRORS ARE CORRECTED ("Canons of Criticism": chiefly from Griesbach).

1. Brevior lectio praeferenda est verbosiori.
2. Difficillima et obscurior lectio anteposenda est pleniori et extricatori quoad librariorum.
3. Locutiones minus emphaticae propius ad genuinam scripturam accedunt.
4. Lectiones quae ex mera librariorum incuria, e.g. ex rhythmica fallacia vel ex ὁμοιοτελείᾳ, oriuntur recte rejiciuntur.
5. E pluribus lectio ea praestat quae velut media inter caeteras interjacet.
6. Lectiones suspectae sunt quae pietati vel orthodoxorum dogmatibus prae aliis placent.
7. Repudiantur lectiones glossam redolentes.

EXAMPLES FROM VIRGIL.

II. 1. (a) Aen. 2.778.

Nec te } hinc comitem asportare
 } comitem hinc asportare } Creūsam.
 } comitem portare

(b) Aen. 7.464.

Furit intus } aequi } | fumidus atque.....exuberat amnis.
 } aquae vis }

Contra, Aen. 12.648.

Sancta ad vos { anima a atque } istius inscia culpae | descendam.
 { anima atque } (nescia)

2. (a) Aen. 1.686.

Munera laetitiamque { dii.
 } dei.
 } die.

(b) Aen. 11.708.

Ventosa ferat cui gloria { frandem.
 } laudem.
 } poenam.

3. (a) Aen. 2.114.

Eurypyllum { scitantem } oracula Phoebi | mittimus.
 { scitatum }

(b) Aen. 6.664.

Quique sui memores { aliquos } fecere merendo.
 { alios }

"Young Mepati, come of the Comian stock!"

And lastly Shakespeare; whose text in several places affords a good example of misplaced ingenuity in applying critical principles. The oft-quoted lines in "As You Like It" run:—

And this our life, exempt from public haunt,
Finds tongues in trees, books in the running brooks,
Sermons in stones, and good in everything.

It is said that a certain German commentator could not understand how books could be in brooks without getting wet and spoilt, or how one could get sermons either into or out of stones. Now if he had only been a dull fellow he would have just left the text and passed harmlessly on: but no! he was a genius, and, what is more, a genius put on his mettle. A brief pursuit of the goddess Inspiration, and she was caught! He thus—why not?—restored the passage:—

And this our life, exempt from public haunt,
Finds tongues in trees, *stones in the running brooks,*
Sermons in books, and good in everything!

I have now finished and have to thank you for giving so much of your attention to a subject which cannot be said to have attractions for everyone or to be of primary importance. Nevertheless no student of history and no classical scholar worthy of the name can afford to despise that special medium through which has come down to him from the remotest times all that is most valuable in the precious records of the past. Any care bestowed in moderation on this subject, so far from unfitting us for the duties of our ordinary life, will in reality help to prepare us for them, by training our minds to acquire among other things, that supreme intellectual faculty—the very sum and result of all the powers of the mind—*right judgment*.

APPENDIX.

Description of a Manuscript, alluded to in the foregoing lecture and presented by the lecturer to the Adderley Library.

Codex Latinus et Gallicus membranaceus, in octavo, foliorum 130, seculi XVI ineuntis, bene servatus et scriptus; tribus pictis tabulis quæ paginam complent, quatuor parvis tabulis et multis literis pictis ornatus, in Gallia ut videtur exaratus. Olim peculium...

(A manuscript in Latin and French on parchment, in octavo, consisting of 130 leaves, written early in the XVIth century; in good condition; with three full-page illuminations, four smaller ones, and many painted initial letters. The style of writing and painting is French. Once in the possession of...)

A BOOK OF HOURS.
(HORAE).

CONTENTS :—

Calendar, fol. 1.

Prayers, fol. 7.

Four lessons from the Gospels, followed by prayers, fol. 17.

The Hours :—

Mattins, fol. 37.

Lauds, fol. 47v.

Prime, fol. 53v.

Terce, fol. 56v.

Sext, fol. 59v.

None, fol. 62.

Vespers, fol. 64v.

Compline, fol. 68.

Creed of Anastasius, fol. 72.

Seven Penitential Psalms, fol. 75.

Litany and Prayers, fol. 80.

Office for the dead, fol. 93.

Prayers, fol. 116.

The Hours of the Conception of the Blessed Virgin, fol. 128.

Prayers to the Saints (St. Nicolas, St. Katharine, St. Mary
Magdalen, St. Genevieve), fol. 130v.



ENTOMOLOGICAL SECTION.

THE year 1883, though an improvement on 1882, has still been below the average. Micro-Lepidoptera have been entirely neglected, consequently the energies of the Section hitherto expended on them have been directed towards the Macros. It was thought well to insert in the list such Pyralidina as have been known to be taken. The number of collectors is small, and however energetic the few are, their work cannot come up to what might easily be done if there were more. Let us hope for new additions to the Section. The Stanton Prize after a good competition has been won by Wainwright; Chambers, whose setting was much the best, ran him very close. The successful collection was on the whole good, though the setting, notably in the small Moths, was poor. The notice prize was won by Benson, Chambers again coming in a good second. A few good Moths, as *Roboraria*, *Consignata*, and *Togata* have been taken, and one new to the district—*P. Adonis*, on the railway bank. The N.H.S. Essay prize was won by Chambers, whose production showed much careful work. We are sorry to say no one contended with him, there being only two intending competitors, the other of whom turned faint-hearted. Let us in conclusion look forward to a greater number of collectors and a more favourable year.

Initials of collectors:—

E.F.B.	...	E. F. Benson.
W.F.B.	...	W. F. Blandford.
K.B.	...	K. Boileau.
E.K.C.	...	E. K. Chambers.
W.F.C.	...	W. F. Cholmeley.
H.F.D.B.	...	H. F. Darell-Brown.
A.B.F.	...	A. B. Field.
L.C.H.	...	L. C. Hamerton.
H.G.H.	...	H. G. Hills.
P.H.S.	...	P. Horton-Smith.
C.B.L.	...	C. B. Lias.
M.	...	Mr. Mosely.
H.P.P.	...	H. P. Pullsine.
S.H.R.	...	S. H. Reynolds.
H.R.	...	H. Richardson, Esq.
R.W.R.	...	R. W. Rickards.
E.R.	...	E. Robertson.
W.R.R.	...	W. R. Rotheram.

C.G.S. ...	...	C. G. Spencer.
R.A.W. ...	...	R. A. Waddilove.
W.H.W. ...	...	W. H. Wainwright.

DIURNI.

Pisias Brassicæ—May 16, E.K.C.
Rapæ—April 1, E.W.R.
Napi—May 5, E.F.B.
Anthocaris Cardamines—May 22,
W.H.W.
Gonepteryx Rhamni—March 30,
W.H.W.
Argynnis Paphia—July 13, W.F.B.
Aglaia—June 29, E.F.B., W.H.W.
Adippe—June 29, L.C.H., W.F.C.
Selene—June 5, W.H.W.
Euphrosyne—May 22, E.K.C.,
E.F.B.
Melitea Artemis—May 23, E.K.C.
Vanessa Urticæ—March 18, W.F.B.(h)
July 23, E.F.B.
Io—May 17, H.F.D.B.
Atalanta—June 7, C.G.S.
Cardui—May 31, P.H.S.
Arge Galathea—June 30, E.K.C.,
E.F.B.
Satyrus Ægeria—June 30, E.F.B.
Megæra—May 22, P.H.S.
Janira—June 13, E.K.C.
Hyperanthus—June 29, E.R.
Thecla Rubi—May 22, E.K.C.
Cœnonympha Pamphilus—May 16,
E.K.C.
Polyommatus Phlæas—May 4, E.K.C.
Lycæna Agestis—June 5, E.K.C.
Alexis—May 23, S.H.R.
LYCÆNA ADONIS—June 2, E.F.B.
Alsus—June 30, C.G.S.
(Black Burney).
Nemeobius Lucina—May 12, E.K.C.
Syriothus Alveolus—May 17, H.F.D.B.

Thanaos Tages—May 16, L.C.H., E.K.C.
Hesperia Sylvanus—June 1, E.K.C.,
W.H.W.

Linea—July 6, E.K.C.

NOCTURNI.

Smerinthus Populi—May 29, E.F.B.
Chærocampa Elpenor—June 30,
W.H.W. (Rabley Copse).
Procris Geryon—June 5, E.K.C.
Zygoena Lonicæræ—June 30, G.F.B.
Filipendulæ—May 23, E.K.C.,
E.F.B.
Lithoria Rubricollis—June 20, W.F.C.
Euchelia Jacobææ—June 6, W.H.W.
Chelonia Plantaginis—June 12, E.K.C.,
E.F.B.
Chelonia Caja—July 10, E.K.C. (6).
Arotia Fuligiosa—May 18, E.K.C.
Lubricepeda—June 6, L.C.H.
Menthrastris—May 25, H.R.
Liparis Chrysorrhea—July 1, E.R.
Orgyia Pudibunda—June 11, E.K.C.
Demas Coryli—April 1, E.K.C. (6).
Bombyx Geurcus—July 1, W.H.W.
Odonestis Potatoria—July 1, W.H.W.
GEOMETRINA.
Ourapteryx Sambucata—June 15,
K.B.
Rumia Cratægata—May 9, E.K.C.
Venilia Maculata—June 10, W.H.W.
(Light).
Augerona Prunaria—June 30, A.B.F.
(Black Burney).
Metrocampa Margaritaria—July 8,
M.
Eurymene Dolobraria—June 5, C.R.L.
Selenia Lunaria—June 15, L.C.H.

(Light).

Odontopera Bidentata—June 20,
L.C.H.

Phigalia Pilosaria—March 12, W.H.W.
Hemerophila Abruptaria—May 25,
S.H.R.

Boarmia Repandata—July 10, W.F.B.
Boboraria—July 7, E.K.C. (Sav-
ernake Forest).

Iodis Lactearia—May 22, E.K.C.;
E.F.B.

Ephyra Trilinearia—June 25, E.K.C.
Pendularia—June 29, F.F.B.
(Fir Wood).

Asthena Luteata—June 23, E.K.C.
Candidata—May 22, E.F.B.
Sylvata—June 12, E.F.B.

Acidalia Scutulata—July 10, E.F.B.
Bisetata—July 11, E.F.B.
Incanaria—June 1, E.F.B.
Subsericeata—June 9, E.F.B.
Remutata—May 22, E.K.C.
Aversata—July 1, E.K.C.

Cabera Pusaria—May 22, E.F.B.
Exanthemaria—May 25, E.F.B.

Corycia Temerata—June 3, W.H.W.
Macaria Liturata—June 29, E.F.B.
& W.H.W. (Fir Wood).

Halia Wavaria—June 20, E.K.C., 6,
(Fir Wood).

Strenia Clathrata—July 5, E.F.B.
Panagra Petraria—May 26, P.H.S.
Numeria Pulveraria—June 20, E.F.B.
Fidonia Atomaria—June 12, E.K.C.
& E.F.B.

Minoa Euphorbiata—June 8, W.H.W.
Ligdia Adustata—June 28, L.C.H.
Lomaspolis Marginata—May 24, P.H.S.
Hybernia Rupicaprararia—February 8,
W.H.R.

Leucopheararia—March, W.F.B.

Progemmaria—March 12, W.H.W.
Cheimatobia Brumata—February 8,
W.F.B.

Larentia Didymata—July 1, E.F.B.
& E.K.C.

Pectinitaria—May 28, C.G.S.
Emmelesia Affinitata—June 20, E.F.B.
Alchemillata—June 20, E.K.C.
Albulata—May 19, P.H.S. &
H.F.D.B.

Eupithecia Consignata—May 12,
W.H.W. (Light).
Subumbrata—June 21, E.F.B.
(West Woods).

Castigata—June 12, W.H.W.
Laricata—June 29, E.F.B. (Fir
Wood).

Vulgata—May 28, E.K.C.
Togata—June 29, E.F.B. (Fir
Wood).

Rectangulata—June 12, E.K.C.
Thera Obeliscata—June 12, E.K.C.
& E.F.B.

Ypsipetes Impluviata—June 12,
E.F.B.

Elutata—July 22, E.F.B.
Melanthia Rubiginata—July 10, E.K.C.
& W.F.B.

Ocellata—May 28, C.G.S.
Albicillata—July 4, E.K.C.
Hastata—July 5, E.F.B.

Melanippe Procellata—July 12, H.P.P.
Unangulata—June 12, C.G.S.
Rivata—June 30, E.F.B.
Subtristata—May 22, E.K.C. &
E.F.B.

Montanata—May 22, H.F.D.B.
Fluctuata—May 6, E.K.C.
Anticlea Badiata—June 4, E.F.B.
Coremia Ferrugata—May 20, L.C.H.
Unidentata—May 20, E.F.B.

- Camptogramma Bilineata*—June 11, E.F.B.
Scotosia Vetulata—July 1, E.F.B. & E.K.C.
Rhamnata—July 9, W.F.B.
Cidaria Picata—July 10, E.F.B. & E.K.C.
Corylata—June 14, E.F.B.
Russata—June 7, E.K.C.
Immanata—July 10, E.F.B.
Silaceata—June 6, W.H.W. (Fir Wood).
Pyraliata—July 10, E.K.C.
Fulvata—July 7, E.K.C.
Pelurga Comitata—June 6, E.F.B.
Eubolia Mensuraria—July 13, W.F.B.
Palumbaria—May 28, E.F.B.
Tanagra Chærophyllata—June 6, W.H.W.
 CUSPIDATES.
Platypteryx Falcula—July 10, C.G.S.
Notodonta Ziczac—May 24, W.H.W. (Light).
Diloba Cæruleocephala (Larva)—E.F.B.
 NOCTUÆ.
Thyatira Batis—*July 3, L.C.H.
Cymatophora Duplaris—*July 3, L.C.H. & E.F.B.
Bryophila Perla—July 1, W.H.W.
Acronycta Psi—June 14, H.G.H.
Ligustri—*July 9, M.
Leucania Lithargyria—*June 12, W.F.B.
Comma—June 12, E.F.B.
Pallens—June 30, A.B.F.
Xylophasia Burea—June 19, E.F.B.
Lithoxylea—*July 12, W.F.B.
Sublustri—*July 12, W.F.B.
Polyodon—June 28, E.F.B.
Hepatica—June 30, E.F.B.
Heliophobus Popularis—June 20, T.H.S.
Mamestra Brassicæ—May 27, E.K.C.
Apamea Basilinea—June 12, E.F.B.
Gemina—July 3, E.F.B.
Miana Strigilis—July 1, W.H.W.
Grammesia Trilinea—June 10, E.F.B.
Caradrina Cubicularis—June 20, E.K.C.
Rusina Tenebrosa—May 30, A.B.F.
Agrotis Segetum—*July 3, E.F.B.
Exclamationis—June 30, A.B.F.
Corticea—*July 3, E.F.B.
Tryphæna Pronuba—June 20, E.R.
Noctua Plecta—June 15, E.F.B.
C. Nigrum—July 12, W.F.B.
Festiva—June 12, E.F.B.
Baja—*July 12, W.F.B.
Tæniocampa Gothica—May 28, E.F.B. & E.K.C.
Cerastis Vaccinii—Feb. 9, W.H.B.
Phlogophora Meticulosa—May 30, E.F.B.
Euplexia Lucipara—May 27, E.F.B. (Light).
Aplecta Herbida—*July 12, W.F.B.
Nebulosa—July 3, W.H.W. & E.F.B.
Hadena Oleracea—July 2, E.F.B.
Pisi—June 29, W.H.W.
Cucullia Umbratica—July 1, E.F.B.
Heliothis Marginata—*July 5, M.
Brephos Parthenias—April 1, W.F.B.
Abrostola Urticæ—July 12, W.H.W.
Plusia Chrysis—June 28, W.H.W.
Iota—July 2, E.F.B.
Pulchrina—June 21, L.C.H.
Gamma—May 15, R.A.W.
Gonoptera Libatrix—Feb. 9, W.H.B.
Euclidia Mi—May 22, L.C.H.
Glyphica—May 18, E.F.B. & E.K.C.

Phytometra *Ænæa*—May 22, W.H.W.

PYRALIDINA.

Hypena Proboscidalis.

Herminia Barbalis.

Nemoralis.

Hydrocampa Stagnata.

Botys Pandalis

Verticalis.

Urticata.

Pionea Forficaris.

Scopula Olivalis.

Eudorea Ambigualis.

Aphomia Colonella.

Myelois Cribrum

Crambus Falsellus.

Hortuellus.

Tristellus.

Pascuellus.



COMPLETE LIST OF MARLBOROUGH LEPIDOPTERA.

THE present list is based on that by E. Meyrick, Esq., in the Report of 1877. Thirty-six species have been added, and the localities have been revised so as to include, as far as possible, the results of the Society's work in Entomology for the last six years. Species whose names are printed in small capitals have been added to the list of our Fauna since 1877, while those in italics have not occurred since that date. The generic names are similarly distinguished. In the Micro-lepidoptera only the new species have been distinguished by being printed in capitals, as the work of the Society has latterly been confined almost entirely to the "Macros," and the list of Micro-lepidoptera is therefore an almost verbatim copy of that of 1877.

Since the date of the last complete list the Entomologists of the Society have occupied themselves mainly with the following districts:—Savernake Forest, especially the part about the Ruins of Savernake House, which had hitherto been comparatively unworked, Rabley Copse, the West Woods, and the Railway Line, with occasional visits to Henswood, Stype Wood, Axford, and Mildenhall Borders, &c. The more distant localities in the radius of ten miles round Marlborough, as Thrup Wood, Ramsbury, Chilton Foliat, &c., which were formerly very productive, have hardly ever been visited. Our collectors should try to work some of these, especially the neighbourhood of Great Bedwyn, where the insects are of a very different character to those near Marlborough, and would well repay careful search.

Since 1877 the Butterflies have naturally been well worked up; *V. Antiopa* has once occurred, while the reappearance of *M. Artemis* is most remarkable; the only new species is *L. Adonis*.

Most of the commoner *Sphingina* turn up occasionally; though several rarities are in the List, none have latterly visited us. The *Sesiidae* are almost unrepresented, but some would probably be found if looked for.

The *Bombycina* are pretty well worked; they are about the only group which are ever bred here; but the number of species is not very large. The list of *Noctuina* is creditable, considering that sugaring, which would probably add several species, is only practised under great difficulties.

The *Geometrina* have been well worked, and the recent captures of *Exp. Consignata*, *Irriguata*, and *Togata* ought to stimulate collectors to work up that neglected genus

The *Pyralina* and *Micros.* have been hardly touched, and our list of the former is certainly disappointing. The *Phycidae* are not common here, but still it is hardly creditable to have taken only one specimen in the last six years! *E. Elutella* was once common in Hall, flying about the cocoa-cups.

The *Micros.* want more experience than our collectors can generally bring to them; it is something, therefore, to have added eight new *Tineina*. It is chiefly among this group that we must look for fresh discoveries.

The districts into which I have divided the Forest are as follows:—

A.—The open glades in the part nearest Marlborough, between the Avenues. They contain chiefly scattered birches and hawthorns, with a large quantity of bracken, and an occasional oak.

B.—The Avenues. Insects there taken are almost always found at rest on trunks of trees, chiefly beech.

C.—The oaks on either side of the Grand Avenue.

D.—The preserves and copses about the ruins of Savernake House, just beyond the Fir-wood.

E.—The Fir-wood.

As the names of insects in italics, and of most of the *Micros.* have been taken from other sources, chiefly from the Report of 1877, I am not always responsible for the accuracy of the information about them.

I have used the somewhat obsolete nomenclature of Stainton's 'Manual' to preserve uniformity between this List and preceding ones.

In conclusion, I wish to acknowledge the kindness of P. H. Maddock, Esq., who has carefully revised this list, and of E. Meyrick, Esq., who has suggested many valuable amendments and additions.

W. F. H. BLANDFORD.

RHOPALOCERA.

Gonepteryx Rhamni—common in woods and lanes

Colias Edusa—occasionally taken, last common in 1877; chiefly on the Railway Bank

C. Hyale—common at Ramsbury in 1868

Pieris Brassicae—common generally, scarce in some years

P. Rapae—abundant

P. Napi—ditto

Anthocharis Cardamines—fairly common; woods and lanes

Leucophasia Sinapis—formerly, Rabley, &c.

Arge Galatea—Rabley Copse, and thence eastward, abundant; vide note

Lasiommata Aegeria—in woods, esp. Sav. Forest (D); has not been very common since 1881

L. Megaera—common everywhere, about banks, on the Railway Line, &c.

Hipparchia Semele—Aldbourn, &c., on the downs, formerly on Forest Hill, scarce

H. Janira—abundant

H. Tithonus—ditto

H. Hyperanthus—ditto

Coenonympha Pamphilus—ditto

Limnitis Sibilla—Stype W., Loves W., Henswood, not common, once in Sav. Forest (D), vide note

Apatura Iris—Stype W., Henswood, not rare

Cynthia Cardui—common on downs, Martinsell, Glory Ann, &c., erratic in appearance

Vanessa Atalanta—not very common, Sav. Forest (D), &c.

V. Io—common

V. Antiopa—once in Sav. Forest?; and again by Mr. Coleman near the Railway Line in 1880

V. Polychloros—Sav. Forest (A), &c., latterly scarce

V. Urticae—abundant

Grapta C-Album—twice, in 1863 and 1875

Argynnis Paphia—common in woods, especially Sav. Forest

A. Adippe—ditto, very common at Rabley

A. Aglaia—ditto

A. Selene—abundant in woods and copses

A. Euphrosyne—ditto

Melitaea Cinxia—said to have formerly occurred near Bedwyn

M. Athalia—formerly taken near Bedwyn

M. Artemis—common, vide note

Nemeobius Lucina—common in Rabley and Sav. Forest (D)

Thecla Betulae—West W., Ramsbury, very common in some years

T. W-Album—moderately common, round the tops of trees at bottom of Forest Hill; beyond Puthall Gate on Hungerford road, on *Umbelliferae*; Stype W., &c.

T. Quercus—common in all oak woods

T. Rubi—West W., Sav. Forest (D), and sometimes abundant at Rabley

Chrysophanus Phlaeas—sparingly on Railway Line, &c.

Lycæna Argiolus—occasionally common, amongst holly, has only been taken once or twice since 1877

L. Alsus—Black Burney Bottom, formerly on Hill between Manton Copse and West W., moderately common

L. Arion—near Marlborough, scarce; once in Sav. Forest near the 'Eight Walks'

L. Adonis—once on Railway Bank in 1883

L. Alexis—abundant

L. Agestis—common, West W., Black Burney Bottom, &c.

Thymele Alveolus—common, West W., Rabley

Thanaos Tages—ditto, ditto, and on Railway Bank

Pamphila Linea—abundant

P. Sylvanus—ditto in woods and copses

P. Comma—Martinsell, locally common

SPHINGINA.

Procris Statice—Martinsell, locally abundant

P. Geryon—very abundant at Rabley, and in neighbourhood, also at Martinsell and on Forest Hill

Zygaena Lonicerae—Black Burney Bottom, Rabley, and Sav. Forest (D)

Z. Filipendulae—common everywhere, most abundant at Rabley

Smerinthus Ocellatus—occasional

S. Populi—at light and at rest, about the College, &c., common

S. Tiliae—not uncommon, about the College, &c.

Acherontia Atropos—occasional

Sphinx Convolvuli—ditto

S. Ligustri—common, especially larvae on privet

Deilephila Livornica—Marlborough, once

Chaerocampa Celerio—ditto, on Sav. Forest cricket ground

C. Elpenor—at rest on plants, or flying at dusk, not scarce

C. Porcellus—at flowers, occasional

Macroglossa Stellatarum—ditto, sometimes rather common, flies the whole season in sunny weather

M. Fuciformis—Sav. Forest, West W., &c.

M. Bombyliiformis—Marlborough

Sesia Tipuliformis—common in gardens

S. Bembeciformis—Marlborough

BOMBYCINA.

Hepialus Hectus—Rabley, Sav. Forest (sometimes on tree trunks in B), Knighton, &c.

H. Lupulinus—abundant

H. Humuli—rather common

H. Velleda—Sav. Forest (D), and Rabley, where it is common and where the var. *Carnus* was taken in 1882

H. Sylvinus—Ramsbury, &c., local

ZEUZERA AESCULI—rare, Granham Hill, &c., not taken before 1879

- Cossus Ligniperda*—larvae occasionally taken
Cerura Furcula—not rare; larvae taken in Sav. Forest (B) in 1880
C. Bifida—taken at Ramsbury in 1877
C. Vinula—not uncommon
Stauropus Fagi—one or two specimens of the larva or imago taken nearly every year on beech-trunks in Sav. Forest (B), or at Stype W.
Notodonta DROMEDARIUS—Larva in Sav. Forest (A), 1880
N. Ziczao—scarce, imago at light in 1880, larvae sometimes in the osier-beds along the Kennet
Pterostoma Palpina—West W. at light, and at Marlborough, larvae formerly common in the small plantation by the New Raquet-Court.
Drymonia Dodonaea—at light in 1877, Marlborough
Leiocampa Dictaea—at light, scarce
L. Dictaeoides—one at light in 1877, one on a beech in Sav. Forest (A) in 1880
Lophopteryx Camelina—larva and imago common in Sav. Forest (B) on beech
Diloba Caeruleocephala—common, especially at light about the College, larvae abundant on hawthorn
Petasia Cassinea—not rare, at light at the College: and larvae and imagines in Sav. Forest (A,B,C,) generally on oak
Peridea Trepida—once at light, Marlborough
Pygmaea Bucephala—common, larva and imago on trees
Psilura Monacha—in woods, larvae not scarce in Sav. Forest (C and D) in crevices of oak bark
Dasychira Pudibunda—common on trees, Sav. Forest (B), &c.
Demas Coryli—Sav. Forest (B), common on trees, often abundant in larval stage, and at Rockley.
Orgyia Antiqua—common, Sav. Forest (A), &c.
O. Gonostigma—Marlborough?
Stilpnotia Salicis—not uncommon, Stype W.
Porthesia Auriflua—abundant at light, larvae common by beating in hedges
Mitochrista Miniata—Sav. Forest, West W., and not rare about Marlborough at gas-lamps where it may be found in the morning lying on the glass at the bottom
Lithosia Aureola—Sav. Forest, Ramsbury, rare; rather common on beeches in Sav. Forest (B) in May and June, 1880
L. Complannula—common, by beating, and at dusk
L. Griseola—Ramsbury, Chilton, &c.
var. Stramineola—with the last
Onestis Quadra—Sav. Forest (B), the imago rare, larva more frequent on beeches, Rockley.

- Gnophria Rubricollis*—Sav. Forest (B) on trees; West Woods, where it sometimes flies in swarms round oaks, also at Stype W.
- Cyboria Mesomella*—near Great Bedwyn
- Nudaria Mundana*—Ramsbury, &c., not common
- Euthemonia Russula*—Sav. Forest, but not for many years; one at light at Marlborough College in 1881
- Arctia Caja*—abundant
- Nemeophila Plantaginis*—Sav. Forest, West W., where it is locally abundant, especially below the Keeper's house, along the bottom of a young fir plantation
- Phragmatobia Fuliginosa*—West W., Pewsey Road, Rabley, &c., occasional
- Spilosoma Menthastri*—abundant at light, and at rest on walls
- S. Lubricepeda*—ditto, ditto
- Diaphora Mendica*—at light, and occasionally at rest in hedge-rows, &c., not very common
- Callimorpha Jacobææ*—often very common among Ragwort; Rockley, West W., Railway Line, &c.
- Lasiocampa Rubi*—formerly at West W.
- L. Quercus*—common
- Eriogaster Lanestris*—larvæ sometimes very common, Stype W., &c.
- Poecilocampa Populi*—Marlborough College, common at light and Sav. Forest (A and C), on oaks
- Trichiura Cratægi*—occasional
- Olisicampa Neustria*—Ramsbury, &c., and Marlborough College at light, scarce
- Odonestis Potatoria*—abundant
- Gastropacha Quercifolia*—moderately common, larvæ formerly common in a hedge along the Bath Road, near Manton
- Cilix Spinula*—common, to light from the Mound, and flying at dusk
- Platypteryx Lacertinaria*—Sav. Forest (A and D), flies commonly among birches, or may be beaten out
- Drepana Falcataria*—with the last, rather more common
- D. Hamula*—Sav. Forest, rare
- D. Unguicula*—Sav. Forest (B), common on beeches or flying in the avenues, Stype W.
- Fumea nitidella*—Rabley, Henswood

NOCTUINA.

- Thyatira Derasa*—Rabley, West W., at sugar: Marlborough College, at light, especially common on windows in the front of C House
- Thyatira Batis*—Rabley, West W., not rare at sugar

Cymatophora Duplaris—Rabley, West W., abundant at sugar, also by beating in the day-time

C. Diluta—Manton Copse

C. Or—West W.

C. Flavicornis—Sav. Forest and West W., rather common on tree-trunks, and sometimes on the wing by day, would probably occur freely at sugar

C. Ridens—Sav. Forest, Manton Copse, vide note

Bryophila Perla—abundant on walls, and at light

B. Glandifera—Marlborough, in 1870

Acronycta Tridens—occasionally at Aldbourne in larval stage

A. Psi—abundant on tree-trunks and palings

A. Aceris—Sav. Forest (A and E), not common, on tree-trunks

A. Megacephala—common on poplars

A. Alni—larvæ have been taken at Ramsbury five or six times

A. Ligustri—Rabley, &c., at sugar

A. Rumicis—ditto, and West W., common

Leucania Conigera—Ramsbury, West W., at flowers at dusk, &c.

L. Turca—Sav. Forest, common at sugar; has been bred from pupæ found there in Dist. A.

L. Lithargyria—Rabley, rather frequent at sugar

L. Comma—Marlborough College, &c., common at light

L. Impura—common, at sugar and at flowers

L. Pallens—ditto, abundant

Gortyna Flavago—Marlborough, at light

Hydraecia Nictitans—Poulton, Sav. Forest, flying by day

H. Micacea—not unfrequent about Marlborough at light

Axylia Putris—common at light and sugar

Xylophasia Burea—Sav. Forest (B), abundant, also at Rabley at sugar
var. Combusta—with the last, not rare

X. Lithoxylea—Rabley, very common at sugar

X. sublustreis—ditto, and at light at Marlborough College

X. Polydon—very abundant at light and sugar

X. Hepatica—very common at sugar

Neuria Saponariae—Ramsbury, Sav. Forest, &c.

Heliophobus Popularis—common at light

Cerigo Cytherea—ditto, scarce

Luperina Testacea—ditto, abundant

L. Cespitis—once at light.

Mamestra Anceps—West W. and Axford, at sugar, and flying by day

M. Brassicae—most abundant, at light, at sugar, and on walls, palings, &c.

- M. Persicariae*—occasional, with the last
Apamea Basilinea—very abundant
A. Gemina—common at light and sugar
A. Unanimitis—ditto, Ramsbury, and about Marlborough
A. Oculea—very abundant
Miana Strigilis—very common at sugar
M. Fasciuncula—Rabley at sugar
M. Furuncula—ditto, common
M. Arcuosa—Ramsbury, &c., local, at dusk
Grammesia Trilinea—Rabley, abundant at sugar
Caradrina MORPHEUS—Rabley, at sugar, in 1883
C. Alsines—Ramsbury, at light
C. Blanda—ditto, and at sugar
C. Cubicularis—abundant, at sugar and light
Rusina Tenebrosa—Rabley, common at sugar, also Ramsbury at light
Agrotis Pupa—at light
A. Suffusa—common at sugar
A. SAUCIA—one in a room at Marlborough College, 1880
A. Segetum—very common, at sugar
A. Exclamationis—at sugar, and on trees, very abundant
A. Corticea—Marlborough, Ramsbury, not rare
A. Tritici—formerly on the Railway Bank
A. Aquilina—Thrup W.
A. Porphyrea—Bedwyn, common among heather, by beating in the day-time
Triphaena Ianthina—in hedgerows, &c., occasional, by beating, and at dusk
T. Fimbria—Littlecote, Sav. Forest (A), at sugar
T. Interjecta—not uncommon
T. Orbona—common, at sugar, flowers, &c.
T. Pronuba—generally exceedingly abundant
Noctua Depuncta?—in 1871, vide note
N. Augur—common at sugar
N. Plecta—ditto, and at flowers, and flying at dusk
N. C-Nigrum—Rabley, at sugar, and at light rather common
N. Triangulum—Rabley, Ramsbury, at sugar
N. Rhomboidea—Ramsbury at sugar
N. Brunnea—Rabley, at sugar, and Sav. Forest (B) on beeches, common
N. Festiva—Rabley, plentiful at sugar
N. Bella—common at light, Marlborough College, &c.
N. Baja—Rabley, Ramsbury, common at sugar
N. Xanthographa—abundant, at sugar, &c.

- Trachea Piniperda*—Ramsbury Plantation; has not been taken by Members of the Society for some years
- Taeniocampa Gothica*—very common, at rest on walls, &c., and at Sallow-bloom
- T. Rubricosa*—at Sallow
- T. Instabilis*—ditto, plentiful, pupae very common by digging
- T. Populeti*—Marlborough, pupae near Manton, scarce
- T. Stabilis*—abundant, especially on trees in Sav. Forest (B), also at Sallow, and by pupa-digging
- T. Gracilis*—at Sallow
- T. Miniosa*—ditto, West W., uncommon
- T. Munda*—ditto, not rare, and Sav. Forest (B) on trees
- T. Cruda*—at Sallow, common
- Orthosia Lota*—Marlborough, at sugar
- O. Macilenta*—Sav. Forest, ditto
- Anchocelis Pistacina*—abundant, at sugar, &c.
- A. Lunosa*—common, at sugar, and at light
- A. Litura*—ditto
- Cerastis Vaccinii*—ditto, abundant, and Sav. Forest (B) after hybernation
- C. Spadicea*—moderately common, at sugar
- Scopelosoma Satellitia*—common, at sugar, and on trees after hybernation
- Dasycampa Rubiginea*—one in 1870
- Xanthia Cerago*—at light, larvae in Sallow-catkins, not rare
- X. Flavago*—ditto, common
- X. Ferruginea*—ditto
- Cosmia Trapezina*—abundant, at sugar; and by beating, both as larva and imago
- C. Diffinis*—common, at sugar, Ramsbury, &c.
- C. Affinis*—Ramsbury, not scarce
- Eremobia Ochroleuca*—Henswood, Aldbourne, and Railway Bank, by day on flowers of *Carduus* or *Centaurea* vide-note
- Dianthocia Carpophaga*—Ramsbury, Marlborough, at light
- D. Capsincola*—at flowers, especially *Lychnis* and *Silene*, not rare
- D. Cucubali*—ditto, Rabley, scarce, once at light at Marlborough College
- Hecatera Serena*—Loves W., &c., at sugar
- Epunda LUTULENTA*—in 1878, locality unrecorded
- E. Lichenea*—Marlborough?
- E. Viminalis*—West W., at light in 1877
- Miselia Oxyacanthae*—Sav. Forest (B), common
- Agriopis Aprilina*—ditto, larvae frequent in crevices of oak-bark
- Phlogophora Meticulosa*—ditto, generally common at sugar

- Euplexia Lucipara*—Rabley, common at sugar, and on walls and fences
Aplecta HERBIDA—common at sugar, Rabley, and on trees, especially Sav. Forest (B), and Granham Hill
A. Nebulosa—Rabley and Sav. Forest (D), plentiful on trees and at sugar
A. Advena—Rabley, at sugar, not uncommon
Hadena (ADUSTA)—ditto, moderately common, but vide note
H. Protea—rather common
H. Dentina—abundant on trees, Sav. Forest (B), Martinsell, &c., and at sugar
H. Oleracea—very common at light, and at sugar
H. Pisi—West W., at sugar, larvae often common in Sav. Forest (A) on bracken
H. Thalassina—abundant at sugar, and on walls and fences
H. W-LATINUM—one at rest in 1882, Granham Hill
Xylocampa Lithorhiza—common, on palings
Calocampa Erolea—not scarce, Marlborough, &c.
Xylina Rhizolita—Sav. Forest (B), and on walls, not very common
X. Semibrunnea—Axford, rare
Cucullia Verbasci—Larvae often abundant on Mullein
C. Chamomilla—larvae at Bedwyn, 1875, on *Anthemis* or *Matricaria*
C. Umbratica—common at flowers, and on palings, West W., School Field, &c.
HELIOTHIS MARGINATA—a few at sugar at Rabley, 1880 and 1883
Acontia Luctuosa—Railway Bank, 1870
Brephos Parthenias—Sav. Forest (A and D), common, flies by day among birches
B. Notha—Henswood, West W., said to be common
Abrostola Urticae—rather common at light and flowers and on palings
A. Triplasia—ditto, ditto
Plusia Chrysitis—at flowers, &c., common
P. Festucae—scarce, Marlborough College, at light in 1881, &c.
P. Iota—not uncommon at flowers and at light
P. PULCHRINA—with the last
P. Gamma—abundant
Gonoptera Libatrix—common at sugar and hybernating in buildings
Amphipyra Pyramidea—at sugar, common
A. Tragopogonis—ditto, abundant, larvae common on hawthorn
Mania Typica—common
M. Maura—ditto, at sugar
Toxocampa Pastinum—Bedwyn Brails
Catocala Nupta—not scarce, among willows
Euclidia Mi—Railway Bank, Sav. Forest (D), Rabley, flies commonly by day
E. Glyphica—with the last
Phytometra Aenea—Railway Bank, Rabley, locally abundant, flies by day

GEOMETRINA.

- Ourapteryx Sambucaria*—common at dusk
Epione Apiciaria—rather common
Rumia Crataegata—abundant
VENILIA MACULATA—one in Sav. Forest (D), one on the Railway Bank, in 1880
Angerona Prunaria—West W., Henswood, Mildenhall Borders, rather common
Metrocampa Margaritata—common especially in Sav. Forest (B) as larva and imago
Elloppia Fasciaria—Ramsbury, Sav. Forest (E), scarce
Eurymene Dolobraria—Sav. Forest (B), common on beeches, West W.
Pericallia Syringaria—Ramsbury, &c., scarce, larvae on privet along Pewsey Road
Selenia Illunaria—very common, by beating, and at dusk
S. Lunaria—Sav. Forest (B), Marlborough College at light, scarce
S. Illustraria—ditto, Ramsbury Plantation, scarce
Odontopera Bidentata—common, on trees, &c.,
Crocallis Elinguaria—ditto, ditto
Ennomos Tiliaria—moderately common, at light
E. Fuscantaria—at light, and Sav. Forest (B), scarce
E. Erosaria—at light, scarce
E. Angularia—ditto, Sav. Forest (B), very common on trees
Himera Pennaria—Sav. Forest (B and D), on leaves or tree-trunks, and at light, common
Phigalia Pilosaria—Sav. Forest, Granham Hill, Manton Copse, &c., on oaks, common
Nyssia Hispidaria—once at light, once on a beech in Sav. Forest (D) in 1881
Amphidasis Prodrumaria—Sav. Forest, on oaks, scarce, occasionally at light
A. Betularia—Sav. Forest (B), Manton Copse, not very common
Hemerophila Abruptaria—at light, and on walls, &c., rather common
Cleora Glabraria—Sav. Forest (D), Cakewood, larvae on a fence in Sav. Forest (E) 1881, scarce
C. Lichenaria—Rabley Copse, Manton, &c., not uncommon on trees and palings
Boarmia Repandata—abundant in woods
B. Rhomboidaria—abundant, on trees and at light
B. Roboraria—Sav. Forest (C), Puthall W., on oaks, not common
B. Consortaria—once at light
Tephrosia Crepuscularia (*Biundularia*, *Newm.*)—Sav. Forest (D and E), Styte W., common on trees
T. Laricaria (*Crepuscularia*, *Newm.*)—with the last
T. Extersaria—Sav. Forest (B and C), Puthall W., West W., Styte W., not common

- T. Punctulata*—Sav. Forest (D), common
Pseudoterpna Cytisaria—Aldbourn, Rabley, Sav. Forest, not rare
Geometra Papilionaria—Rabley (common in 1881), Boltaridge W.
Iodis VERNARIA—two at light in Marlborough, 1881
I. Lactearia—abundant in woods
Phorodesma Bajularia—Sav. Forest, Henswood, rare
Hemithea Thymiaria—common in hedge-rows
Ephyra Porata—Black Burney Bottom, &c., not recently common
E. Punctaria—Sav. Forest (A), Puthall W., not scarce
E. Trilincaria—Sav. Forest (B), common
E. Omicronaria—Puthall W., West W., &c.
E. Pendularia—ditto, Sav. Forest (D), not common
Asthena Luteata—common in hedgerows, Pewsey Road, Rabley Lane, &c.
A. Candidata—abundant
A. Sylvata—Sav. Forest (D), West W., rather common
A. Blomeri—Ramsbury Plantation
Acidalia Scutulata—abundant in hedges
A. Bisetata—ditto
A. Trigeminata—Marlborough, in hedges, &c., not common
A. Virgularia—common at light, on fences, &c.
A. Subsericeata—once, Marlborough
A. Remutata—abundant in woods
A. Imitaria—Ramsbury, &c., said to be common
A. Aversata—abundant
Bradyepetes Amataria—Sav. Forest (D), and other woods, rather common
Cabera Pusaria—abundant
C. Exanthemaria—common in woods
Corycia Punctata—Sav. Forest (A), by beating, and on beeches, common
C. Taminata—with the last, scarce
Aventia Flewula—Knighton, scarce
MACARIA LITURATA—Sav. Forest (E), common, vide note
Halia Wavaria—common in gardens
Strenia Clathrata—Railway Bank, Sav. Forest (D), &c., common
Lozogramma Petraria—Sav. Forest, abundant among bracken
Numeria Pulveraria—Sav. Forest (D), not common; not uncommon at Henswood
Fidonia Atomaria—common among heather, West W., &c.
F. Piniaria—among firs, Sav. Forest (E) rare, common at Stype W.
Minea Euphorbiata—Sav. Forest (A and C), Henswood, Rabley, not rare among spurge
Abraxas Grossulariata—abundant in gardens and hedges

- A. Ulmata*—Bincknoll, Ramsbury, scarce
Ligdia Aduastata—Sav. Forest (D), Rabley Lane, Pewsey Road, common among spindle
Lomaspilis Marginata—common among willow
Hybernia Rupicaprarum—common at light.
H. Leucophaearia—common on oak trees in woods, especially West W.
H. Aurantiaria—Sav. Forest (B), not very common
H. Progemmaria—ditto, very common
H. Defoliaria—ditto, and at light, common, larvae very abundant
Anisopteryx Aescularia—abundant, on trees, &c.
Cheimatobia Brumata—abundant
Oporabia Dilutata—Sav. Forest (A and B), &c., common
Larentia Didymata—common everywhere, abundant at Rabley, &c.
L. Multistrigaria—Sav. Forest (D), scarce
L. Olivaria—Sav. Forest (B and D), moderately common
L. Miaria—very abundant in Sav. Forest, &c.
Emmelesia Affinitata—Oare, Bincknoll, once in Sav. Forest (D), locally common, but not in immediate neighbourhood of Marlborough; in hedgerows
E. Alchemillata—Rabley, abundant; common in hedgerows, Manton Lane, &c.
E. Albulata—Sav. Forest (D), locally abundant, and at Chisledon
E. DECOLORATA—taken at Stype W. in 1881
Eupithecia Venosata—West W., Ramsbury
E. CONSIGNATA—two caught at light in 1881 and 1883, one bred by P. H. Maddock, in 1882, vide note
E. Centaureata—Marlborough, on palings, &c., not common.
E. Succenturiata—Mildenhall, Sav. Forest (D), &c., scarce
E. Subfulvata—rather common
E. SUBUMBRATA—Sav. Forest (D), scarce
E. Plumbeolata—common in woods.
E. Haworthiata—Mildenhall, Ramsbury, not common
E. Castigata—common
E. Lariciata—Sav. Forest (E), common, Ramsbury, Bincknoll, among larch.
E. Irriguata—Sav. Forest (B and D), rare, two or three on beeches in 1880 and 1881, and a few previously,—probably wants looking for
E. INNOTATA—once in 1879, locality unrecorded
E. Nanata—once at light
E. Subnotata—common
E. Vulgata—abundant at light and on walls
E. Assimilata—common in gardens

- E. Subciliata*—Littlecote Park, once
E. Dodoneata—Sav. Forest (D), scarce
E. Abbreviata—Sav. Forest, &c., common
E. Exiguata—ditto, ditto
E. TOGATA—Sav. Forest (E), one in 1883, vide note
E. Pumilata—not common
E. Coronata—Sav. Forest (D), Ramsbury, scarce
E. Rectangulata—common, at light, &c.
Lobophora Viretata—Sav. Forest in 1871, two in 1882 (at Rabley ?)
L. Lobulata—Sav. Forest (B), rather common
T. Variata—very common in all fir woods
T. Firmaria—Chilton, Ramsbury Plantation
Ypsipetes IMPLUVIATA—once in Sav. Forest (B), 1881
Y. Elutata—abundant in hedges, &c.
Melanthia Rubiginata—Sav. Forest (A and D), rather common amongst hawthorn
M. Ocellata—common, Sav. Forest (B and D), and in hedges
M. Albicillata—Sav. Forest (D and E), Henswood, not scarce, generally on trees, from which it flies off at a collector's approach
Melanippe Hastata—Sav. Forest (D), West W., Puthall W., not common
M. Procellata—formerly at Manton Copse, scarce, taken in 1883 at Mildenhall borders, vide note
M. Unangulata—Sav. Forest (A,C,D), Avebury Ring, &c., not uncommon
M. Rivata—Sav. Forest (A and D), &c., not scarce
M. Birivata—very common
M. Montanata—abundant
M. GALLATA—once in Sav. Forest (A), in 1880
M. Fluctuata—abundant
Antiolea Rubidata—Rabley, West W., uncommon
A. Badiata—common, on palings and trees, &c.
A. Derivata—ditto, at light, and on trees in Sav. Forest (D)
Coremia Propugnata—Sav. Forest, generally common
C. Ferrugaria—common everywhere
C. Unidentaria—with the last, not so common
Campptogramma Bilineata—abundant
C. Fluviata—once at light in 1877
Phibalapteryx Tersata—among clematis, Henswood, and abundantly in a lane near Axford, at light at Marlborough College in 1881
P. Lignata—Marlborough, said to be common
P. Vitalbata—Ramsbury, scarce
Scotosia Dubitata—common, at light, on walls, &c,

- S. Vetulata*—common among buckthorn, especially in Rabley Lane
S. Rhamnata—with the last, but not so common and does not fly so readily by day, Rabley Lane, Avebury Ring, Knighton
S. Certata—Marlborough
S. UNDULATA—once in 1878, two in 1881 at West W. and Mildenhall
Cidaria Miata—Sav. Forest (B), and at light, common
C. Picata—Sav. Forest (D), Mildenhall, and other woods.
C. Corylata—common in copses
C. Russata—generally common
C. Immanata—ditto
C. Suffumata—Sav. Forest (D), not uncommon
C. Silaceata—ditto, generally rather common
C. Prunata—Ramsbury, Marlborough, in gardens
C. Testata—not rare among salallows, &c.
C. Fulvata—common in hedgerows
C. Pyraliata—ditto, especially at Rabley
C. Dotata—at light, and in gardens and hedges, not so common as the preceding
Eubolia Cervinaria—at light
E. Mensuraria—abundant, Rabley, &c.
E. Plumbaria—Clench Common, abundant, occasional in Sav. Forest
E. Bipunctaria—on the downs, locality unknown
E. Lineolata—ditto, ditto
Anaitis Plagiaria—West W., and at light, moderately common
Chesias Spartiata—has been taken at light
Odesia Cherophyllata—Sav. Forest, abundant among bracken

PYRALIDINA.

- Hypena Proboscidalis*—abundant, among nettles
H. Rostralis—not rare, chiefly after hybernation, at light, &c.
Rivula Sericealis—Bedwyn, Boltaridge, and other woods, common
Herminia Barbalis—common in woods, Sav. Forest (D), West W., Henswood, &c.
H. Tarsipennalis—ditto, ditto
H. Nemoralis (Grisealis)—Sav. Forest (B and D), West W., &c., abundant
Pyralis Farinalis—about buildings, once common
P. Glaucinalis—in 1881, locality unrecorded
Aglossa Pinguinalis—abundant about buildings
Pyrausta Punicealis—Marlborough Downs, Rabley, Railway Bank, &c.
P. Purpuralis—ditto, common
var. Ostrinalis—with the last

- Herbula Cespitalis*—Rabley, Railway Bank, &c., common
Ennychia Anguinalis—Rabley, West W.
Cataclysta Lemnata—about ponds, not uncommon
Paraponyx Stratiotata—ditto, and at light
Hydrocampa Nymphæata—about ponds, at Bincknoll, Chisleton, &c., common
H. Stagnata—common about ponds, Sav. Forest, &c.
Acentropus Niveus—once, Canal, Burbage
Botys Pandalis—Rabley, common, Sav. Forest (A and D)
B. Verticalis—abundant, among nettles
B. Fuscalis—common in hedges
B. Urticata—ditto
Ebulea Crocealis—Sav. Forest, Bedwyn
E. Sambucalis—common
Pionea Forficaris—ditto
Spilodes Cinctalis—rather common
Scopula Lutealis—Sav. Forest, common in hedges near the Cricket Ground, &c.
S. Olivalis—abundant in hedges
S. Prunalis—ditto
S. Ferrugalis—Henswood, Bolteridge W., scarce
Stenopteryx Hybridalis—Railway Bank, &c., common
Nola Cucullatella—Sav. Forest (B), Marlborough College at light
N. Cristulalis—Sav. Forest (B and D), common on trees and fences
Simaethis Fabriciana—abundant among nettles
Choreutes Scintillulana—Chilton, in 1872
Eudorea Cembra—Ramsbury, at light
E. Ambigualis—abundant
E. Pyralella—Sav. Forest (D and E), &c., very common
E. Cratagella—rather common
E. Frequentella—abundant
E. Resinea—Knighton, Bolteridge, not rare
E. Angustea—Marlborough, at light
Aphomia Colonella—common at light about the College, &c.
Achroia (Grisella)—Marlborough, Ramsbury
Ephestia Elutella—ditto, ditto
Homæosoma Nebulella—Ramsbury, not scarce
H. Binaevella—Marlborough, Ramsbury
Acrobasis Consociella—Thrup W.
A. Tumidella—Henswood, Thrup W.
Cryptoblabes Bistriga—Bolteridge W., scarce

- Myelois Cirrigerella*—Ramsbury at light, scarce, vide note
Nephopteryx Roborella—Bedwyn, &c., common
Crambus Chrysonuchellus—Sav. Forest, locally common
C. Falsellus—Ramsbury, Avebury, in thatch
C. Pratellus—abundant
C. Pascuellus—Chisbury, Bedwyn, &c.
C. Hortuellus—abundant
C. Culmellus—ditto
C. Inquinatellus—common
C. Geniculens—ditto
C. Selasellus—Knighton
C. Tristellus—abundant
C. Pinetellus—Railway Bank, Stype W., &c.
C. Perlellus—Ramsbury, Bedwyn, &c.
CHILO FORFICELLUS—one flying over a pond near the "Column" in Sav. Forest in 1879
Chloophora Prasinana—Sav. Forest, Rabley, &c., common, larvæ often plentiful in Sav. Forest (B and C), chiefly on oak
C. Quercana—Sav. Forest (B), Stype W., scarce

TORTRICINA.

- Hypermecia Angustana*—common
Eulia Ministrana—ditto
Antithesia Corticana—Henswood, scarce
A. Betuletana—West W., Stype W., &c., common
A. Capræana—Puthall W.
A. Ochroleucana—rather common
A. Cynosbatella—common
A. Pruniana—abundant
A. Marginana—Bedwyn, Manton Copse, &c., scarce
A. Gentianana—Bedwyn, Mildenhall
A. Ustulana—Thrup W., Rabley, Loves W.
Tortrix Viridana—abundant
T. Fosterana—Ramsbury, &c., common
T. Heparana—common
T. Rileana—ditto
T. Corylana—less common
Lozotænia Sorbiana—Rabley, Loves W., &c., common
L. Musculana—common
L. Costana—Knighton
L. Unifasciana—very common

- L. Fulvana*—common
L. Roborana—Stype W., Loves W., Thrup W.
L. Xylosteana—very common
L. Rosana—abundant
Ditula Angustiorana—very common
Ptylochoma Lecheana—common
Notocelia Udmanniana—rather common
Pardia Tripunctana—common
Spilonota Roborana—ditto
S. Rosaeolana—not rare, Ramsbury, West W.
S. Trimaculana—rather common
Lithographa Campoliliana—common
L. Nisella—common, West W., &c.
L. Penkleriana—very common
Phlaeodes Tetraquetra—Bedwyn, West W., Puthall W.
Poedisca Piceana—Boltaridge W.
P. Solandriana—common
P. Ophthalmicana—Thrup W., West W., not common
Catoptria Scopoli—Ramsbury, Rabley
C. Fulvana—Ramsbury, local
C. Hohenwarthiana—Thrup W., Bedwyn, &c., common
Halonota Bimaculana—Bedwyn, West W., Henswood
H. Cirsiana—Bedwyn Brails
H. Scutulana—Railway Bank, &c.
H. Brunnichiana—common
H. Tetragonana—Thrup W., Puthall W., &c., not rare
Dicrorampha Petiverella—common
D. Sequana—Bedwyn
D. Politana—Stype W., Aldbourne, Ramsbury, &c.
D. Simpliciana—Cakewood
D. Plumbagana—very common
D. Consortana—Bedwyn Brails
Coccyx Hyrciniana—very common
Cartella Bilunana—West W.
Hedya Paykulliana—Henswood
H. Ocellana—very common
H. Dealbana—ditto
H. Neglectana—Ramsbury, common
H. Trimaculana—very common
Steganoptycha Naevana—ditto
Achylopera Mitterbacheriana—Henswood, Sav. Forest (D), not rare

- A. Diminutana*—Knighton, Boltsridge W., scarce
A. Lundana—very common
A. Derasana—Rabley, Knighton, not common
A. Comptana—Everleigh Downs
Bactra Lanceolana—very common
B. Furfurana—Ramsbury, Bedwyn; at light
Argyrotoza Conwayana—abundant
Dictyopteryx Contaminana—ditto
D. Loeflingiana—ditto
Croesia Bergmanniana—ditto
C. Forskaleana—ditto
C. Holmiana—common
Hemerusia Rheediella—Mildenhall, Sav. Forest, &c., common
Oxygrapha Literana—Sav. Forest (D), Rabley, &c., common
Peronea Schalleriana—Bedwyn, Rabley, Henswood
P. Comparana—very common
P. Tristana—Boltsridge W., Mildenhall, &c.
P. Rufana—Aldbourn Gorse
P. Favillaceana—very common
P. Hastiana—Marlborough, Aldbourn Gorse, common
P. Variegana—very common
Paramesia Aspersana—Stype W., Thrup W., &c., very common
Teras Caudana—Manton Copse, Bedwyn
Poecilochroma Profundana—common
P. Corticana—very abundant
P. Oppressana—Ramsbury, on poplars, West W., common
Anisotaenia Ulmana—Blakes W., Littlecote, &c.
Roxana Arcuella—West W., Rabley, Thrup W., &c.
Semasia Spiniana—Rabley Lane, Knighton, &c.
S. Woerberana—Ramsbury
S. Janthinana—ditto, not common
S. Rufflana—Bedwyn Brails
S. Nanana—Blakes W., Ramsbury Plantation, &c.
Eucelis Aurana—Knighton, Boltsridge W.
Ephippiphora REGIANA—Granham Hill, on sycamores, common
E. Argyrana—Sav. Forest, common on trees
E. Nigricostana—Savernake, Axford, Knighton, &c.
Stigmonota Nitidana—Thrup W.
S. Compositella—Ramsbury, &c., common
S. Perlepidana—generally common
Asthenia Splendidulana—Sav. Forest, Henswood

- Retinia Buoliana*—Eastridge
R. Pinivorana—Sav. Forest, Eastridge, common
B. Occultana—Bolteridge, not common
Endopisa Proximana—Knighton, Bincknoll, &c.
Carpocapsa Juliana—Sav. Forest
C. Splendana—Thrup W., Sav. Forest, &c.
C. Grossana—Thrup W., &c., not scarce
C. Pomonella—Ramsbury
C. Funebrana—Ramsbury, not common
Grapholita Albersana—Puthall W., West W., &c.
G. Ulicetana—abundant
G. Hypericana—very common
Cnephasia Hybridana—very common
C. Subjectana—abundant
C. Virgaureana—ditto
C. Alternella—common
C. Nubilana—Ramsbury, local
Ablabia Pratana—Aldbourn Down
Euchromia Striana—very common
Orthotænia Antiquana—Ramsbury, in marshy ground
Sericoris Lacunana—abundant
S. Urticana—common
Lobesia Reliquana—common in woods
Chrosis Tesserana—very common
Argyrolepis Subbaumanniana—Aldbourn, Martinsell, on downs
A. Badiana—Ramsbury Plantation
A. Cnicana—Rabley, common
Eupoecilia Maculosana—Manton, Bolteridge W., common
E. Nana—Ramsbury
E. Angustana—common
E. Manniana—not scarce
E. Rupicola—West W., Knighton, locally common
E. Roseana—Bedwyn Brails
E. Ruficiliana—Henswood, Forest Hill
Lozopera Dilucidana—Bedwyn Brails
L. Francillana—Eastridge, scarce
Xanthosetia Hamana—very common
X. Zoegana—Loves W., Rabley, scarce
Tortricodes Hyemana—abundant in woods

TINEINA.

- Chimabacche Phryganella—Thrup W., Marlborough
 C. Fagella—very common
 Semioscopis Avellanella—Ramsbury Park
 S. Steinkellneriana—Sav. Forest
 Talsporia Pseudobombycella—cases in Sav. Forest
 Xysmatodoma Melanella—Sav. Forest, Ramsbury
 Tinea Rusticella—common
 T. FULVIMITRELLA—Sav. Forest (D), common on oaks
 T. Tapetzella—Marlborough, Ramsbury
 T. Arcella—rather common
 T. GRANELLA—Sav. Forest
 T. Cloacella—common
 T. Misella—Marlborough
 T. Fuscipunctella—ditto
 T. Pellionella—abundant
 T. Lapella—common
 T. Semifulvella—not scarce
 Lampronia Quadripunctella—Manton, rather common
 L. Praelatella—Rabley, Loves W., &c.
 L. Rubiella—rather common
 Incurvaria Masculella—common
 I. CAPITELLA—Sav. Forest (D), on oaks
 Nemophora Swammerdammella—common
 N. Schwarziella—ditto
 N. Metaxella—Ramsbury Plantation
 Adela Fibulella—rather common
 A. Degeerella—common in woods
 A. Viridella—abundant
 Nemotois Scabiosellus—Thrup W.
 Micropteryx Calthella—abundant
 M. Aruncella—Marlborough
 M. Seppella—abundant
 M. Mansuetella—Chilton, scarce
 M. ALLIONELLA—Rabley
 M. Thunbergella—common in woods
 M. Purpurella—Loves W., Henswood, &c., common
 M. Salopiella—Loves W.
 M. Semipurpurella—Henswood, Loves W., &c., common
 M. Unimaculella—Manton Copse, Henswood, &c., not common
 M. Fastuosella—Manton Copse

- M. Subpurpurella*—abundant
Swammerdamia Apicella—rather common
S. Caesiella—abundant
S. Griseocapitella—Puthall W., not common
S. Lutarea—common generally
S. Pyrella—common amongst hawthorn
Hyponomeuta Plumbellus—very common
H. Padellus—common
H. Evonymellus—ditto
Anesychia Decemguttata—locally common
Prays Curtisellus—common
Plutella Cruciferarum—abundant
P. Porrectella—Marlborough
Cerostoma Sequella—Ramsbury
C. Vittella—common
C. Radiatella—abundant
C. Costella—common
C. Sylvella—Chisleton, &c., common
C. Alpella—Sav. Forest, Thrup W., Henswood, &c.
C. Horridella—Knighton, scarce
C. Scabrella—Sav. Forest, scarce
C. Xylostella—common
Theristis Caudella—Ramsbury, West W.
Phibalocera Quercana—very common.
Depressaria Costosa—common
D. Liturella—Rabley Lane, &c.
D. UMBELLANA—one in Sav. Forest (B), 1881
D. Assimilella—Martinsell
D. Atomella—ditto
D. Arenella—abundant
D. Propinquella—common
D. Subpropinquella—abundant
D. Alstroemeriana—not common
D. Purpurea—abundant
D. Hypericella—Rabley W., Bedwyn Brails
D. Conterminella—Marlborough
D. Ocellana—Axford
D. Yeatiana—Ramsbury, Axford
D. Applana—abundant
D. Giliella—common
D. Pimpinellae—Axford, Marlborough, &c.

- D. Albipunctella*—very common
D. Chaerophylli—Axford, Marlborough
D. Ultimella—Ramsbury, &c., common
D. Nervosa—Axford, Marlborough, &c.
D. Pastinacella—Ramsbury, scarce
D. Heracliana—very common
Gelechia Cinerella—Henswood, Rabley, Stype W.
G. Rufescens—very common
G. Populella—Ramsbury, Bedwyn, &c.
G. Ericetella—West W., very common
G. Mulinella—Clench Common
G. Sororculella—Ramsbury
G. Terrella—abundant
G. Acuminatella—Ramsbury, Rabley, &c.
G. Affinis—abundant in thatch
G. Domestica—ditto
G. Proximella—West W., Bedwyn Brails, common
G. Notatella—West W., &c., common
G. Vulgella—Sav. Forest, &c., scarce
G. Luculella—Henswood, West W.
G. Fugitivella—Marlborough
G. Maculea—common
G. Tricolorella—ditto
G. Sequax—Rabley, Thrup W., common
G. Albiceps—Henswood
G. Dodecella—Eastridge
G. Triparella—Ramsbury, Manton W.
G. Tenebrella—Chisbury, Eastridge, Boltsridge
G. Ligulella—Bedwyn Brails
G. Tæniolella—Marlborough
G. Anthyllidella—ditto, Thrup W., &c.
G. Atrella—Boltsridge, Bedwyn, Rabley, &c.
G. Bifractella—Stype W.
G. Gemmella—Stype W., Henswood, Loves W., &c.
G. Næviferella—Marlborough, Axford
Chelaria Hübnerella—common
Anarsia Spartiella—Burridge Heath
Sophronia Parenthesella—Henswood
Harpella Geoffrella—Rabley, West W., Henswood, &c., common
Dasycera Sulphurella—Ramsbury, Sav. Forest, &c., common
Oecophora Flavimaculella—Rabley

- O. Tinctella*—common in woods
O. Fuscescens—Ramsbury, Marlborough
O. Pseudopretella—abundant
Endrosis Fenestrella—ditto
Butalis Fuscescens—Thrup W., common
B. Senescens—Bedwyn Brails, Thrup W.
Panalia Latreillella ?—Rabley
P. Lewenhöckella—West W., Eastridge, &c., common
Glyphipteryx Fuscoviridella—abundant
G. Cladiella—Knighton, common
G. Thrasionella—ditto
G. Equitella—Fyfield, Hungerford
G. Fischeriella—very common
Perittia Obscuripunctella—Henswood, Manton Copse, common
Antispila Pfeifferella—common
Tinagma Sericiellum—ditto
T. Resplendellum—Bedwyn Brails
Argyresthia Ephippella—Rabley W. Thrup W., very common
A. Nitidella—abundant
A. Semitestacella—Bedwyn, Cakewood, Ramsbury, &c.
A. Albistria—abundant
A. Semifusca—Marlborough, Ramsbury
A. Mendica—common
A. Retinella—Bedwyn Brails
A. Dilectella—Everleigh Downs, common
A. Curvella—Bincknoll, common
A. Pygmaella—Ramsbury, Bedwyn Brails
A. Goedartella—abundant
A. Brocksella—Rabley W., Loves W.
Cedestis Farinatella—Eastridge
Ocnorostoma Piniariella—ditto
Zelleria Insignipennella—Ramsbury Plantation
Gracilaria Swederella—common
G. Stigmatella—ditto
G. Elongella—Sav. Forest, Cakewood
G. Tringipennella—Ramsbury, Marlborough, common
G. Syringella—abundant
G. Auroguttella—common
Coriscium Brongniardellum—Ramsbury
C. Sulphurellum—Sav. Forest
Ornix Avellanella—abundant

- O. Anglicella*—ditto
O. Betulae—Sav. Forest, Chisbury W.
O. Torquillella—Marlborough, Ramsbury
O. Guttea—Mildenhall, Ramsbury
Coleophora Laricella—abundant
C. Solitariella—Sav. Forest, Ramsbury, not common
C. Lutipennella—common
C. Fuscadinella—abundant
C. Viminetella—Manton W., Rabley W., Boltsridge W.
C. Siccifolia—Knighton, Boltsridge
C. Gryphipennella—rather common
C. Nigricella—common on birch, &c.
C. Albitarsella—Rabley, West W., &c., scarce
C. Alcyonipennella—Bedwyn Brails, Ramsbury
C. Fabriciella—Ramsbury, at light
C. Palliatella—Thrup W., Littlecote W.
C. ALBICOSTA—Sav. Forest, along Hungerford Road, 1881
C. Lixella—Marlborough
C. Discordella—Rabley Lane
C. Therinella—Ramsbury
C. Troglodytella—Knighton
C. Argentula—Mildenhall, Knighton, &c.
C. Annulatella—Boltsridge, &c.
C. Murinipennella—Puthall W., Crofton, &c., very common
C. Caespititiella—common
Batrachedra Pinicolella—Blakes W.
Oinophila V-flava—Ramsbury
Chauliodes Chaerophyellus—Axford, Aldbourne, common
Laverna Lacteella—Boltsridge W.
L. Miscella—Loves W., Thrup W.
L. Epilobiella—abundant
L. OCHREELLA—Sav. Forest? In 1880
L. Phragmitella—Chilton, Knighton, very common
L. Decorella—Ramsbury, Mildenhall, &c., common
L. Subbistrigella—Ramsbury
L. Atra—Ramsbury, Sav. Forest (D)
Chrysoclista Flavicaput—Marlborough, Chisledon, &c.
Asychna Modestella—Henswood
A. TERMINELLA—larvæ common in September at Ramsbury (*E. Meyrick*).
Chrysocorys Festaliella—generally distributed
Stephensia Brunnichella—Mildenhall, Thrup W., common

- Elachista Magnificella*—Rabley
E. Gleichenella—Eastridge
E. Albifrontella—common in woods
E. Cinereopunctella—Ramsbury
E. Luticomella—Rabley, Thrup W. Manton, &c.
E. Atricomella—rather common
E. Nigrella—abundant
E. Bedellella—common on downs
E. Obscurella—abundant
E. Subnigrella—Boltsbridge, W.
E. Megeriella—Boltsbridge, Rabley, &c.
E. Zonariella—Rabley, Manton W., Boltsbridge
E. Gangabella—Eastridge
E. Biatomella—Sav. Forest
E. Triatomea—Rabley, Knighton, &c., common
E. Pollinariella—Rabley
E. Rufocinerea—abundant
E. Cygnipennella—ditto
Tischeria Complanella—very common
T. Marginea—common
Lithocolletis Sylvella—ditto
L. Cramerella—abundant
L. Heegeriella—Loves W., Chisbury W., common
L. Alnifoliella—Bedwyn, common
L. Lautella—Pewsey
L. Ulmifoliella—Henswood, Sav. Forest, Bedwyn
L. Spinolella—Chiseldon
L. Salicicolella—Stype W.
L. Pomifoliella—abundant
L. Spinicolella—common
L. Faginella—abundant
L. Coryli—very common
L. Lantanella—Mildenhall, Knighton, &c., common
L. Quercifoliella—abundant
L. Messaniella—Chilton, ditto
L. Viminella—Axford
L. Nicellii—Loves W., Blakes W., Axford, &c.
L. Schreberella—Mildenhall, Chilton, &c.
L. Emberizaepennella—Puthall W.
L. Tristrigella—Marlborough, &c.
L. Trifasciella—common

Lyonetia Clerckella—Ramsbury
Phyllocnistis Suffusella—abundant
P. Saligna—ditto
Cemiosoma Laburnella—abundant in gardens
Buoculatrix Aurimaculella—Bedwyn Brails, Marlborough
B. Crataegi—Marlborough
Nepticula Atricapitella—common
N. Ruficapitella—ditto
N. Pomella—Ramsbury
N. Oxyacanthella—Marlborough
N. Visoerella—ditto
N. Anomalella—Ramsbury, Marlborough, &c.
N. Cathartice—Ramsbury, very common
N. Septembrella—Rabley, Cakewood
N. Headleyella—Thrup W.
N. Subbimaculella—very common
N. Salicis—Stype W., Blakes W., &c.
N. Flosactella—very common
N. Luteella—Henswood
N. Angulifasciella—Ramsbury, &c., common
N. Microtheriella—common
N. Betulicola—Puthall W.
N. Plagiolella—Rabley Lane, &c.
N. Tityrella—Sav. Forest, very common
N. Gratiola—Axford, abundant
N. Marginicollis—Marlborough, Ramsbury
N. Aurella—abundant

PTEROPHORINA.

Pterophorus Trigonodactylus—Railway Bank, common
P. Acanthodactylus—Rabley
P. Phaeodactylus—Chilton, Bedwyn, &c.
P. Bipunctidactylus—Thrup W., Rabley, &c.
P. Loewii—Rabley in 1883, vide note
P. Fuscus—abundant, esp. at Rabley.
P. Pterodactylus, ditto
P. Microdactylus—West W.
P. Galactodactylus—common
P. Tetractylus—Common Frith
P. Pentadactylus—abundant

Alucita Polydactyla—abundant, at light, &c.

NOTES.

Arge Galatea—This insect has been gradually getting commoner, and extending its range westwards. A scarce variety occurs not unfrequently at Rabley Copse, in which the markings are reddish-chocolate on a yellow ground.

Limenitis Sibilla—Till about fifteen years ago this insect was quite unknown in the neighbourhood. It has since been common, but is hardly so now, and is not found within easy reach of Marlborough.

Melitæa Artemis—Was formerly reported from Clatford Bottom and Chisledon; for many years it was thought to be extinct, but in 1881 and subsequently it has appeared singly, or in small numbers, all over the Marlborough district; a proceeding totally unlike its usual habits.

The other two species of *Melitæa* have been extinct for very many years in this neighbourhood.

Cymatophora Ridens—Previous to 1881, was reported from Manton Copse, where it was very rare, but in that year the larvæ absolutely swarmed on oak and beech in Savernake Forest, where it had never before been known to occur.

Noctua Depuncta—Was omitted in the list of 1877, but occurred in that of 1871. I know nothing of the correctness of the original notice.

Eremobia Ochroleuca—Mr. Meyrick tells me that this insect ought certainly to be taken annually in fair quantities by proper searching. I therefore recommend it to the notice of collectors.

Hadena Adesta—As this insect has appeared in the Reports of 1879—80—81—82, I introduce it here, but I believe that, owing to an error in the Society's collection, a variety of *A. Gemina* has been mistaken for it. Perhaps subsequent collectors will clear up the doubt.

Macaria Liturata—This insect is so common among the firs in Savernake Forest that its non-appearance in the list of 1877 is somewhat remarkable. It was probably due to an oversight.

Eupithecia Consignata—Seems to occur about the College. Of the two specimens captured one was taken in Hall, the other on a lamp there.

Eupithecia Togata—Was previously inserted, only on the authority of Stainton's 'Manual,' which reports it from Marsden near Devizes. I have therefore ventured to print it as a new species, it having been taken in the Fir Wood in 1883 by E. F. Benson, for the first time in the history of the Society.

Melanippe Procellata—I can hardly understand this insect occurring at Manton Copse, as previously reported. The larva feeds on *Clematis Vitalba*, and Henswood and Axford, or Clench Common would be likelier localities.

Myelois Cirrigerella—I cannot do better than quote Mr. Meyrick's own words :—"They were taken June 30th, 1874, at light in the neighbourhood of Marlborough, Wilts: some eight or nine specimens came in the course of the evening, but I only secured four in a condition worth setting, as they manifested a most pernicious affection for the flame of my candles; the remainder succeeded in self-immolation. I did not meet with more on subsequent evenings, which I attribute principally to somewhat unfavourable weather. Some of the specimens were quite fresh, others considerably worn. I suspect that June 20th will be about the time to look for it in general and that it is only out for a short time. It flew between 11 and 12 p.m." *Ent. Mo. Mag.* for March, 1875. The above is the only recorded capture of the species in Britain.

Pterophorus Læwii—I believe that the capture of this insect for the first time at Marlborough this year, was also the first capture of it in the South of England.

I should have said in the Introduction that "Rabley" and "Mildenhall" refer to the two copses of those names. "Marlborough" includes any locality in its immediate neighbourhood, which cannot be more strictly or advantageously defined, and the term, in the Macro-lepidoptera at least, is never used where a more explicit one can be substituted.



COLEOPTERA.

DURING the past year a moderate number of captures has been recorded, and a few new species have been taken, but it has been thought hardly worth while to print the list of notices in full. The work done has been of a very desultory character, and more energy and system is needed to make records of sufficient value to justify printing. We are sorry to report a falling off from last year. It is true we have not had Blandford to work at this section of Entomology, but there is a fair field open to any one who has a real interest in Science, and that there are many such we fully believe, if we are not indeed sadly poverty-stricken. The difficulties, too, of starting are now considerably lessened by our possessing in the new Museum a collection, which is fast becoming of some value, and has had a fine addition made to it by Blandford's munificent gift of his beetles, taken during the past few years. It is difficult perhaps to leave the Lepidoptera and turn to a less widely popular order, but it is a mistake to regard the different branches of Entomology as mutually exclusive, and the Coleoptera offer far greater variety of form and colour, and more continuous opportunities of study than almost any other. The way to begin is to work with the collection in the possession of the Society, and to try to add to it. A very little practice and knowledge will enable us to extend it considerably, and those ready to work will be laying the foundation of an useful store of information, and a new source of pleasure.

Turning to the list of notices, E. K. Chambers' name appears prominently, and he has made a few good captures, such as *Oodes helopioides*, a new species here, taken on the wall by the Lodge towards the end of May, *Ocypus morio* and *pedator*, neither common with us, *Olythra 4-punctata*, and *Chilocorus renipustulatus*, which latter we do not fancy we have seen here before, both on June 9th. He reports *Cicindela campestris* seen on May 29th on the gravel-pits in the forest, *Lesteva pubescens* seen on March 1st, and *Sinodendron cylindricum* on June 10th. A good many Water-beetles, and some new to us, were recorded by Mr. Hart-Smith, noticed in the ponds below Martinsell, on the Field day, held on May 29th. The Hydradephaga are very scanty in our collection, and a great many new species might be successfully hunted down in water. Of the genus *Hydroporus* four species, *palustris*,

picipes, *planus* and *reticulatus* figure on the list, also *Laccophilus hyalinus*, *Laccobius minutus*, *Agabus paludosus*, *Anacæna variabilis*, and others more frequently seen. E. F. Benson reported a new insect, *Olophrum piceum*, on January 28th, and his name appears several times. Mr. Moseley, while working here in July, took *Tachyporus solutus*, which is new to the district, and also *Silphalittoralis* and *Campylus linearis*. *Tachinus subterraneus* was taken in the Wilderness by Mr. Hart-Smith on February 18th, and *Apion virens* by Darell-Brown on January 28th. *Melolontha vulgaris* first appeared on May 16th, and *Telophorus bicolor* was seen as early as May 8th. The thorn-trees in the forest furnished many species of *Telephorus*, *Anaspis*, *Meligethes*, *Epuræa*, &c. *Donacia semicuprea* was abundant on June 30th on *Iris luteus* at Axford, and is recorded in A. Percival's name, and on the same day *Athous niger* was taken. The species of *Rhagium* occur not uncommonly in Rabley Copse, and *R. indagator* was seen by Hamorton on May 19th. This closes the list of the at all interesting captures. There is clearly plenty of material for work: it is to be hoped that next year we shall be able to report a goodly increase to our collection.



BOTANICAL REPORT.

THE following List of dates, accurate as far as it goes, is far shorter than usual, and though the list of contributors is long, it is only one or two who have really done any work. In fact, after the departure of R. W. Rickards, the whole thing collapsed, and no interest whatever was taken by the majority of the members of the Society.

Till the beginning of March, temperature was above the mean, but then a very cold period set in, lasting till the middle of May. This ultimately threw vegetation very backward, it having been previously very forward, though not so much so as last year. From the middle of May to the middle of June it was warm, but after that it was generally cold for the time of year. Rainfall, except for three weeks in January and February, was below the mean till the middle of June, after which it was generally in excess of its proper amount.

For Agricultural purposes there has seldom been a more favourable year for those who could take advantage of the fine weather. Farm labour has been so much reduced, that generally there was much delay, and in these cases the results, though favourable, were not nearly such as might have been expected.

Generally speaking, plants in January were about 13 days early, in February 19 days early, in March 12 days early; in April, first week, 11 days early, afterwards 3 days late; in May 8 days late, in June 4 days late, and in July about an average date.

In January there were 38 plants in flower, as against 50 in 1882.

February	"	41	"	"	63	"
and in March	"	54	"	"	107	"

Names of those whose Initials occur in the following List:—

W.J.V.B.	...	...	Rev. W. J. V. Baker
A.B.	...	...	A. Bell
E.F.B.	...	...	E. F. Benson
F.E.B.	...	...	F. E. Bull
E.K.C.	...	...	E. K. Chambers
C.G.C.	...	...	C. G. Chambers

H.W.C.	...	...	H. W. Cholmeley
H.J.G.	...	...	H. J. Grummitt
K.G.	...	...	Miss K. Gwillim
M.G.	...	...	Miss M. Gwillim
L.C.H.	...	...	L. C. Hamerton
T.N.H.S.	...	...	Rev. T. N. Hart-Smith
J.A.H.	...	...	J. A. Hay
W.R.I.	...	...	W. R. Inglis
E.J.	...	...	Mrs. E. Jephson
H.G.A.L.	...	...	H. G. A. Leveson
W.M.	...	...	W. Mansell, Esq.
G.T.K.M.	...	...	G. T. K. Maurice
O.C.M.	...	...	O. C. Maurice
S.H.R.	...	...	S. H. Reynolds
H.R.	...	...	H. Richardson, Esq.
R.W.R.	...	...	R. W. Rickards
H.B.R.	...	...	H. B. Rickards
E.D.R.	...	...	E. D. Ross
C.E.T.	...	...	Rev. C. E. Thorpe
C.W.W.T.	...	...	C. W. W. Thorpe
F.E.T.	...	...	F. E. Thompson, Esq.
C.T.R.	...	...	C. Trevor Roper
W.L.W.	...	...	W. L. Wainwright
<i>Thalictrum</i>			<i>viridis</i> Jan. 24, F.E.T.
<i>flavum</i>	by June 23.		<i>Aquilegia</i>
<i>Anemone</i>			<i>vulgaris</i> May 17 (cult.)
<i>nemorosa</i> ...	Feb. 11, R.W.R.		<i>Papaver</i>
<i>Ranunculus</i>			<i>Rhœas</i> June 10, H.R.
<i>penicillatus</i>	April 4, F.E.T.		<i>Chelidonium</i>
<i>Flammula</i> ...	by June 28.		<i>majus</i> May 14, H.J.G.
<i>auricomus</i> ...	March 31, R.W.R.		<i>Fumaria</i>
<i>acris</i>	Feb. 7, F.E.T.; Ap. 18.		<i>officinalis</i> ... May 31.
<i>repens</i>	May 5, H.W.C.		<i>Raphanus</i>
<i>bulbosus</i> ...	March 7, F.E.T.;		<i>Raphanistrum</i> by June 28, W.R.I.
	April 20.		<i>Sinapis</i>
<i>arvensis</i> ...	full June 16 (Chisel-		<i>arvensis</i> ... May 19.
	don), T.N.H.S.		<i>alba</i> May 19.
<i>Ficaria</i>	Jan. 8.		<i>Brassica</i>
<i>Caltha</i>			<i>Rapa</i> by May 5.
<i>palustris</i> ...	Jan. 14, K.G.; Feb. 16.		<i>Diploxaxis</i>
<i>Helleborus</i>			<i>muralis</i> June 22 (cult.)

- Sisymbrium*
officinale ... full July 10.
Alliaria April 25, K.G.
- Cardamine*
pratensis ... March 31, R.W.R.
hirsuta Jan. 20, R.W.R.
sylvatica ... full May 5, H.G.A.L.;
 H.R.
- Arabis*
thaliana ... by May 5, H.W.C.
hirsuta by May 20, C.E.T.
- Barbarea*
vulgaris by May 19.
- Nasturtium*
officinale ... June 5.
- Draba*
verna Feb. 2, F.E.T.
- Capsella*
Bursa-pastoris Feb. 16, R.W.R. (new
 plant).
- Lepidium*
campestre ... full June 9, H.W.C.
- Senebiera*
Coronopus ... April 30, July 10.
- Reseda*
lutea full June 30, J.A.H.
- Helianthemum*
vulgare May 28.
- Viola*
odorata March 2, E.J.
hirta March 11, R.W.R.
sylvatica
Riviniana ... April 7, E.J.
Reichen-
bachiana May 5.
tricolor
arvensis ... by May 5.
- Polygala*
vulgaris ... May 16, H.W.C.
calcareae ... by May 5, H.W.C.
- Silene*
inflata June 9, H.W.C.
- Lychnis*
vespertina... full June 5.
diurna May 18, C.E.T.
Flos-cuculi May 31.
Githago..... June 30, H.B.R.
- Cerastium*
triviale April 20.
- Stellaria*
media..... all the year.
Holostea ... April 14, K.G.
graminea ... June 6.
uliginosa ... May 22.
- Arenaria*
trinervis ... April 30. /
serpyllifolia June 12, H.W.C.
- Sagina*
procumbens May 15.
- Spergula*
arvensis..... June 30, H.W.C.
- Hypericum*
perforatum July 8.
tetrapterum July 8, (cult).
pulchrum ... by July 10.
hirsutum ... June 30, L.C.H.
- Malva*
moschata ... July 10, H.W.C.
sylvestris ... June 19, G.T.K.M.
rotundifolia April 30.
- Tilia*
intermedia... July 13, H.W.C.
- Linum*
catharticum June 12, H.W.C.
- Geranium*
Phæum May 10, (cult).
pratense ... May 29, H.G.A.L.
pyrenaicum May 5, E.K.C.
molle May 5, E.K.C.
dissectum... June 17, S.H.R.
columbinum May 22.
lucidum..... May 23, H.G.A.L.

- Robertianum May 19.
 Oxalis
 Acetosella... April 23, M.G.
 Ilex
 Aquifolium by June 6.
 Euonymus
 europæus ... June 2, H.W.C.
 Rhamnus
 catharticus by June 6.
 Acer
 Pseudo-plat-
 anus May 22.
 campestre ... by May 19.
 Ulex
 europæus ... Jan. 7.
 Genista
 tinctoria ... about July 3, E.K.C.
 Sarothamnus
 scoparius ... May 5, H.W.C.
 Ononis
 arvensis..... about July 7, H.W.C.
 Anthyllis
 vulneraria... May 10, J.W.V.B.
 Medicago
 lupulina..... April 30.
 Melilotus
 officinalis ... June 29, E.K.C.;
 H.W.C.
 Trifolium
 pratense ... April 30.
 hybridum ... June 30, H.B.R.
 repens June 6.
 procumbens June 28.
 minus May 22.
 Lotus.
 corniculatus May 27.
 Hippocrepis.
 comosa May 27.
 Onobrychis.
 sativa..... May 22.
 Vicia.
 hirsuta May 22.
 tetrasperma June 6.
 Cracca about June 21.
 sylvatica ... June 23.
 sepium May 1, F.E.B.
 angustifolia full, June 6.
 Lathyrus.
 pratensis ... June 5.
 Orobus.
 tuberosus ... May 24.
 Prunus.
 spinosa April 17.
 Avium April 18.
 Cerasus by April 30.
 Spiræa.
 Ulmaria..... June 13, H.W.C.
 Filipendula June 16 (cult.)
 Agrimonia.
 Eupatoria ... June 26th, H.W.C.
 Poterium.
 Sanguisorba April 30.
 Alchemilla.
 vulgaris..... by May 5.
 Potentilla.
 Fragariastrum Jan. 23, H.J.G.
 Tormentilla... May 16, H.W.C.
 reptans June 5.
 anserina May 19.
 Fragaria
 vesca April 30.
 Rubus.
 Idæus..... May 28 (cult.)
 discolor July 25.
 tuberculatus June 23.
 cæsius May 31, H.W.C.
 Geum.
 urbanum ... May 22.
 intermedium May 27.
 rivale April 30.
 Rosa.
 tomentosa ... full, June 30, T.N.H.S.

- rubiginosa* ... June 20 (cult.)
canina June 5, G.T.K.M.
arvensis..... June 19, G.T.K.M.
Cratægus.
Oxyacantha May 22.
Pyrus.
aucuparia ... by May 22, C.E.T.
Malus..... May 9, H.G.A.L.
Epilobium.
angustifolium July 4 (cult.); July
10, H.W.C.
hirsutum ... July 22.
montanum... June 7.
Circæa.
lutetiana ... June 27.
Callitriche.
verna May 5, H.W.C.
Bryonia.
dioica..... June 17, H.W.C.
Ribes.
Grossularia about April 7.
Sedum.
album June 29, E.K.C.
acre June 12.
Saxifraga.
tridactylites Feb. 26, F.E.T.
granulata ... April 30.
Sanicula.
europæa ... May 19.
Helosciadium.
nodiflorum June 28.
Ægopodium.
Podagraria June 12.
Bunium.
flexuosum ... May 22, H.W.C.
Pimpinella.
Saxifraga ... June 28.
Enanthe.
fistulosa..... June 28 (cult).
crocata June 6.
Æthusa.
Cynapium ... July 6.
Angelica.
sylvestris ... about July 26.
Pastinaca.
sativa..... June 6.
Heracleum.
Sphondylium May 27.
Daucus.
Carota June 7.
Torilis.
infesta June 30, H.W.C.
Anthriscus,... July 8.
Chærophyllum.
sylvestre ... April 20
temulum ... May 22
Scandix.
Pecten-Veneris by May 5, H.W.C.
Conium.
maculatum (coloured bud) July 8
Hedera.
Helix Sep. 20.
Cornus.
sanguinea ... June 19, H.W.C.
Adoxa.
Moschatellina Feb. 13, R.W.R.
Sambucus.
nigra June 6
Viburnum.
Opulus June 6 (cult June 2,
W.M.)
Lantana..... April 30
Lonicera.
Periclymenum June 23
Galium.
cruciatum ... April 2, R.W.R.
verum June 28.
Mollugo..... June 28.
saxatile June 9, T.N.H.S.
palustre..... June 28.
Witheringii June 23.
uliginosum by June 28.

- Aparine May 19.
 tricornis June 12.
- Asperula
 odorata May 2, K.G., May 10, 22.
 cynanchica June 16, E.K.C.
- Sherardia.
 arvensis May 5, E.D.R.
- Valeriana.
 dioica April 30.
 officinalis ... June 12, H.W.C.
- Valerianella.
 olitoria April 14.
- Scabiosa.
 columbaria June 30, J.A.H.
 arvensis June 17, S.H.R.
- Carduus.
 nutans June 23.
 crispus June 19, H.W.C.
 lanceolatus July 5.
 palustris ... June 5.
 acaulis July 22.
 arvensis July 8.
- Arctium.
 minus July 27.
 nemorosum July 27.
- Centaurea.
 nigra June 23.
 Scabiosa ... June 17, S.H.R.
- Chrysanthemum.
 Leucanthemum
 mum May 31, J.A.H.
- Matricaria
 inodora July 12.
- Anthemis
 Cotula (coloured bud) June 30,
 W.L.W.
- Achillea
 Millefolium June 19, H.W.C.
 Ptarmica ... July 8 (cult).
- Artemisia
 vulgaris about July 27.
- Senecio
 vulgaris all the year.
 Jacobaea ... July 10.
 aquaticus ... July 8.
 campestris ... full June 11, E.K.C.
- Bellis
 perennis ... all the year.
- Tussilago
 Farfara Feb. 3, R.W.R.
- Petasites
 vulgaris Jan. 16, F.E.T.
- Lapsana
 communis ... June 28.
- Hypochoeris
 radicata June 6.
- Leontodon
 hirtus about July 15.
 hispidus by June 6.
 autumnalis June 23.
- Tragopogon
 pratensis ... by May 31.
- Taraxacum
 officinale ... all the year.
- Sonchus
 asper June 6.
 arvensis July 27.
- Crepis
 setosa by June 30, H.W.C.
 virens June 5.
- Hieracium
 Pilosella May 19.
 vulgatum ... by July 10.
- Phyteuma
 orbiculare ... full July 28.
- Campanula
 glomerata ... July 15, S.H.R.
 rotundifolia June 30, H.B.R.
- Fraxinus
 excelsior ... April 10, R.W.R.
- Ligustrum
 vulgare by June 28.

- Vinca**
 major..... Feb. 25, G.T.K.M.;
 (cult), wild May 9,
 K.G.
 minor..... Feb. 3, R.W.R.; Mch.
 25, R.W.R.
- Erythraea**
 Centaurium about July 4, J.W.V.B.
- Gentiana**
 Amarella ... July 28.
- Menyanthes**
 trifoliata ... about June 3.
- Convolvulus**
 arvensis..... June 17, R.H.R.
 sepium July 8.
- Solanum**
 Dulcamara June 14, H.W.C.
- Verbascum**
 Thapsus ... by June 30, W L.W.
 and T.N.H.S.
- Scrophularia**
 Baltisii June 28.
 nodosa May 29.
- Linaria**
 Cymbalaria Mch. 16, R.W.R.
 vulgaris ... June 29, T.N.H.S.
 minor..... June 30, H.W.C.
- Veronica**
 hederifolia... Jan. 20.
 polita May 27.
 agrestis June 5.
 Buxbaumii all the year.
 arvensis..... April 30.
 serpyllifolia May 5, H.W.C.
 officinalis ... June 6.
 Chamaedrys by April 20.
 scutellata ... June 28.
 Anagallis ... by June 12.
 Beccabunga May 30.
- Euphrasia**
 officinalis ... July 25.
- Bartsia**
 Odontites ... June 29, H.W.C.
- Pedicularis**
 sylvatica ... May 16, H.W.C.
- Rhinanthus**
 Crista-galli May 18.
- Melampyrum**
 pratense June 5, H.W.C.
- Lathraea**
 squamaria ... Mch. 18, E.K.C.
- Orobanchae**
 minor June 29, E.K.C.
- Thymus**
 Serpillum ... June 14, H.W.C.
- Calamintha**
 Clinopodium June 30, H.W.C.
- Acinos full June 30, H.B.R.
- Nepeta**
 Glechoma ... Feb. 25, C.G.C.;
 Mch. 16.
- Prunella**
 vulgaris..... by June 23.
- Scutellaria**
 galericulata June 30, E.F.B.
- Ballota**
 nigra June 30.
- Stachys**
 Betonica ... June 30, L.C.H.
 sylvatica ... June 14, H.J.G.;
 S.H.R.
- Galeopsis**
 Ladanium ... June 30, H.W.C.
 Tetrahit..... July 8.
- Lamium**
 amplexicaule by June 13, H.W.C.
 purpureum all the year.
 album all the year.
 Galeobdolon April 30.
- Ajuga**
 reptans April 14.
- Lithospermum**

- officinale* ... May 19.
arvense April 20.
Myosotis
palustris ... June 12, H.W.C.
arvensis..... April 17.
collina April 6, E.J.
versicolor ... by May 22, H.J.G.
Borago
officinalis ... June 20 (cult).
Symphytum
officinale ... by May 19.
Cynoglossum
officinale ... about June 6, T.N.H.S.
Primula
vulgaris..... all the year.
officinalis ... March 24, R.W.R.
Lysimachia
Nummularia June 23 (cult.)
nemorum ... about May 14,
T.N.H.S.
Anagallis
arvensis..... June 26, H.W.C.
Plantago
major June 12, H.W.C.
media..... May 27.
lanceolata ... April 20.
Chenopodium
album July 8.
B. Henricus June 12.
Atriplex
erecta June 30, H.W.C.
Rumex
conglomeratus July 8.
nemorosus
a. viridis June 28.
obtusifolius... June 6.
crispus..... June 19.
Hydrolapa-
thum June 30.
Acetosa May 22.
Acetosella ... May 5.
- Polygonum**
Convulvulus June 23.
aviculare ... June 12.
amphibium June 23, S.H.R.
Bistorta..... June 5.
Daphne
Mezereum... Jan. 31, W.M. (cult).
Laureola ... Jan. 18, F.E.T.
Thesium
humifusum Jan 23, E.K.C.
Buxus
sempervirens March 11, R.W.R.
Euphorbia
Helioscopia June 5, 30.
amygdaloides April 30.
exigua June 30, H.B.R.
Mercurialis
perennis..... barren Jan. 17, F.E.T.;
fertile Jan. 23, R.W.R.
Urtica
dioica..... June 5.
urens May 22.
Ulmus
montana ... Feb. 23.
Corylus
Avellana ... barren, Jan. 18, F.E.T.;
fertile, Jan. 23, R.W.R.
Selix
viminialis ... Feb. 16.
caprea fertile, Feb. 23;
barren, Feb. 25.
Taxus
baccata Feb. 9.
Arum
maculatum April 20.
Potamogeton
perfoliatus... June 23, S.H.R.
Triglochin
palustre..... Jan. 30, A.B.
Orchis
pyramidalis by July 5, C.T.R.

- ustulata..... June 5, O.C.M.
 Morio May 15, T.N.H.S.
 mascula..... April 29, K.G.
 latifolia by June 28.
 maculata ... June 5, H.W.C.
 Gymnadenia.
 conopsea ... June 16, E.K.C.
 Habenaria.
 viridis by June 16, E.K.C.
 chlorantha by May 29, H.W.C.
 Herminium.
 Monorchis... June 30.
 Listera.
 ovata May 27
 Neottia.
 Nidus-avis... June 5, H.W.C.
 Epipactis.
 latifolia bud July 6.
 Iris.
 fetidissima July 2 (cult).
 Pseudacorus June 1.
 Narcissus.
 Pseudo-narcissus Feb. 13, R.W.R.
 Galanthus.
 nivalis Jan. 18, E.K.C.
 Tamus.
 communis ... May 27, H.W.C.
 Polygonatum.
 multiflorum May 23, H.W.C.
 Convallaria.
 majalis May 12 (cult).
 Ruscus.
 aculeatus ... Jan. 25
 Tulipa.
 sylvestris ... April 30, F.E.T.
 Ornithogalum.
 umbellatum June 2 (cult).
 pyrenaicum June 23 (cult).
 Scilla.
 nutans ... bud March 28, C.W.W.T.,
 April 2, R.W.R.
 Allium.
 ursinum..... about May 7.
 Luzula.
 pilosa April 7, E.J.
 campestris April 6, E.J.
 Juncus.
 effusus June 28.
 lamprocarpus July 10.
 Scirpus.
 palustris ... by June 6.
 lacustris ... June 6.
 Carex.
 pulicaris ... bud May 16.
 paniculata... by May 22.
 muricata ... May 22.
 glaucula April 20.
 præcox April 20.
 pendula May 27 (cult).
 sylvatica ... May 22.
 hirta about May 20.
 paludosa ... May 5, May 17, S.H.R.
 riparia May 5, May 19, H.R.
 Anthoxanthum
 odoratum ... by April 20.
 Digraphis
 arundinacea by June 19.
 Alopecurus
 agrestis June 30.
 geniculatus May 31.
 pratensis ... April 20.
 Phleum
 pratense ... June 30.
 Agrostis
 alba by July 8.
 vulgaris June 18.
 Milium
 effusum May 15.
 Aira
 cæspitosa ... June 11.
 Arena
 flavescens ... June 6.

- pubescens ... by May 19.
 pratensis ... May 22.
 elatior May 31.
Holcus
 mollis..... July 8.
 lanatus May 22.
Koeleria
 cristata June 12.
Melica
 uniflora May 22.
Catabrosa
 aquatica..... by May 31.
Glyceria
 fluitans June 5.
 plicata June 5.
 aquatica ... June 28.
Poa.
 annua all the year.
 compressa... full July 10.
 pratensis ... April 20.
 trivialis May 22.
Briza.
 media..... May 27.
Cynosurus.
 cristatus ... May 27.
Dactylis.
 glomerata ... May 22.
Festuca.
 ovina May 22.
 rubra May 17.
 arundinacea June 23.
 pratensis ... June 5.
 lohiacea June 12.
Bromus.
 giganteus ... July 8.
 asper June 12.
 erectus May 5.
 sterilis May 17.
 mollis..... April 20.
Brachypodium.
 sylvaticum June 30.
Triticum.
 caninum ... by June 28.
 repens June 12.
Lolium.
 perenne May 17.
 italicum..... June 6.
Hordeum.
 pratense..... June 23.
Ophioglossum.
 vulgatum ... May 20.
Equisetum.
 arvenso April 20.
 palustre..... June 12.
 limosum ... June 22.



ORNITHOLOGY.

THE number of notices has still further increased this year, and the gaps are therefore much fewer. G. T. K. Maurice is again well to the front, and has made some interesting observations. His departure will be a most serious loss to the Society. Among other discoveries he found that the College exercise books were not wasted when thrown away, but were utilized by the lesser Grebe as a suitable material on which she might rear, if not educate, her young. One or two birds, which are more or less rare in Marlborough, have been noticed. Among others G. A. Risley found a specimen of the Lesser Spotted Woodpecker (*Picus minor*) lying dead in the Forest. He has generously presented it to the N.H.S. A nest of the Common Quail (*Perdix coturnix*) was found by Mr. Mullins' under-gardener on the Common. It was made of dry grass, and contained ten eggs. We have moreover the authority of J. A. Lloyd, Esq., for stating that an unusually rare visitor, the Roller (*Coracias Garrula*) was seen in the Forest on October 21st. We have a stuffed specimen in the Museum, but it is not often seen in England alive.

Key to Initials:

C.B.	...	...	C. Belk
A.B.	...	...	A. Bell
W.H.C.	...	...	W. H. Coats
C.E.C.	...	...	C. E. Cooper
A.L.J.	...	...	A. L. Jackson
R.L.	...	...	R. Langworthy
G.E.C.M.	...	...	G. E. C. Martin
G.T.K.M.	...	...	G. T. K. Maurice
W.B.M.	...	...	W. B. Maurice
L.G.W.O.	...	...	L. G. W. Ogbourne
G.A.R.	...	...	G. A. Risley
A.G.T.	...	...	A. G. Thynne
B.C.W.	...	...	B. C. Waterfield

Appended is the list of notices:—

Kestrel, *Falco Tinnunculus*

Sparrow Hawk, *Falco nisus*—May 8, 2 eggs, G.T.K.M.

Long-eared Owl, *Strix otus*

White Owl, *Strix flammea*

Tawny Owl, *Strix aluco*—March 31, 4 eggs, G.T.K.M.

Red-backed Shrike, *Lanius collurio*—June 1, 1 egg, A.G.T.

Spotted Flycatcher, *Muscicapa grisola*—May 27, eggs, G.T.K.M., C.E.C.;
seen April 30, G.T.K.M.

Missel Thrush, *Turdus viscivorus*

Song Thrush, *Turdus musicus*—March 25, 4 eggs, G.T.K.M., C.E.C.; young
April 5, G.T.K.M.

Blackbird, *Turdus merula*—April 13, 1 egg, G.T.K.M.; 2 young April 20,
G.T.K.M.

Ring Ouzel, *Turdus torquatus*

Hedge Accentor, *Accentor modularis*—April 16, 2 eggs, G.T.K.M.; young
May 2nd, G.T.K.M., B.C.W.

Redbreast, *Sylvia rubecula*—April 11, 1 egg, G.T.K.M.; young June 18,
G.T.K.M.

Redstart, *Sylvia phoenicurus*—May 13, 6 eggs, W.H.C.

Stonechat, *Sylvia rubicola*

Whinchat, *Sylvia rubetra*

Wheatear, *Sylvia ananthe*—seen Feb. 25, Mr. Coleman, near Rockley

Grasshopper Warbler, *Sylvia locustella*—May 26, 2 eggs, L.G.W.O.

Sedge Warbler, *Sylvia phragmitis*—May 19, 1 egg, G.T.K.M.

Reed Warbler, *Sylvia arundinacea*—May 28, 2 eggs, A.G.T.

Nightingale, *Sylvia luscini*

Blackcap, *Sylvia atricapilla*—May 16, eggs, G.T.K.M.; seen March 22,
G.T.K.M.

Garden Warbler, *Sylvia hortensis*—June 6, 3 eggs, C.B.; young June 6, C.B.

Whitethroat, *Sylvia cinerea*—May 24, 1 egg, W.H.C.

Lesser Whitethroat, *Sylvia curruca*

Wood Warbler, *Sylvia sibilatrix*—May 28, 2 eggs, W.H.C.

Willow Warbler, *Sylvia trochilus*—May 27, 7 eggs, C.B., W.H.C.; young June
6, C.B., W.H.C.

Chiff-Chaff, *Sylvia rufa*—May 27, eggs, W.H.C.

Golden-crested Regulus, *Regulus cristatus*—May 23, 3 eggs, W.H.C.

Greater Tit, *Parus major*—in old Sand Martin's nest on May 29; May 13, 3
eggs, G.T.K.M., C.E.C.

Blue Tit, *Parus caeruleus*—in old Sand Martin's nest on May 29; May 13, 1
egg, G.T.K.M., C.E.C.

Cole Tit, *Parus ater*—May 28, 3 eggs, A.G.T.; May 31, 1 egg, G.T.K.M.

Long-tailed Tit, *Parus caudatus*—April 20, eggs, G.T.K.M.

Pied Wagtail, *Motacilla Yarellii*—June 6, 4 eggs, W.H.C.; young May 29,
G.T.K.M.

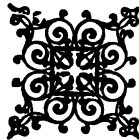
Grey Wagtail, *Motacilla boarula*

Yellow Wagtail, *Motacilla flava*

Tree Pipit, *Anthus arboreus*—May 28, eggs, R.L.

- Meadow Pipit, *Anthus pratensis*—May 27, 1 egg, W.H.C., G.C.M.
- Skylark, *Alauda arvensis*—song Feb. 18, G.T.K.M.; May 15, 1 egg, W.H.C.
- Bunting, *Emberiza miliaria*—June 7, 2 eggs, C.E.C.
- Black-headed Bunting, *Emberiza schœniclus*—May 19, 5 eggs, G.T.K.M.; young May 21, G.T.K.M.
- Yellow Bunting, *Emberiza citrinella*—May 6, 1 egg, W.H.C.
- Chaffinch, *Fringilla caelebs*—April 30, 1 egg, G.T.K.M.; young May 27, G.T.K.M.
- House Sparrow, *Fringilla domestica*—building, C.E.C.; May 6, 4 eggs, G.T.K.M.; young May 26, W.H.C.
- Greenfinch, *Fringilla chloris*—May 13, 2 eggs, W.B.M.
- Hawfinch, *Fringilla coccythraustes*—
- Goldfinch, *Fringilla carduelis*—May 29, 5 eggs, W.H.C.
- Linnet, *Fringilla cannabina*—May 5, 3 nests, 1—3—4 eggs in same gorse, G.T.K.M.; young and 1 egg, May 5, G.T.K.M.
- Lesser Redpole, *Fringilla linaria*—
- Bullfinch, *Pyrrhula vulgaris*—
- Starling, *Sturnus vulgaris*—April 24, 5 eggs, G.T.K.M.; 3 or 4 young May 8, G.T.K.M.
- Carrion Crow, *Corvus corone*—April 16, 5 eggs, G.T.K.M.
- Rook, *Corvus frugilegus*—February 25, building, G.T.K.M.; March 22, 2 eggs, G.T.K.M., C.E.C.; young April 22, G.T.K.M.
- Jackdaw, *Corvus monedula*—April 20, 2 eggs, G.T.K.M.; young May 16, C.E.C.
- Magpie, *Corvus pica*—April 24, 6 eggs, G.T.K.M.; young, May 19, G.T.K.M.
- Jay, *Corvus glandarius*—
- Green Woodpecker, *Picus viridis*—
- Lesser-Spotted Woodpecker, *Picus minor*—
- Creeper, *Certhia familiaris*—May 19, 3 eggs, A.L.J.; young June 8, W.H.C.; found dead in Forest, June 4, G.A.R.
- Wren, *Troglodytes vulgaris*—May 9, 1 egg, G.T.K.M.; young June 3, W.H.C., C.B.
- Nuthatch, *Sitta europæa*—(?) May 26, eggs, C.B.
- Cuckoo, *Cuculus canorus*—April 28, song, G.T.K.M.; May 14, 2 eggs, 1 in old Wagtail's nest, A.G.T.
- Kingfisher, *Alcedo ispida*—
- Swallow, *Hirundo rustica*—May 26, 1 egg, W.H.C.; seen April 14, G.T.K.M.
- Martin, *Hirundo urbica*—June 5, 3 eggs, L.C.W.O.
- Sand Martin, *Hirundo riparia*—May 29, 2 eggs, G.T.K.M.; seen April 14, G.T.K.M.
- Swift, *Cypselus murarius*—June 2, 3 eggs, G.T.K.M.; seen May 11, C.E.C.

- Goatsucker, *Caprimulgus europæus*—June 30, 2 eggs, A.B.
Ring Dove, *Columba palumbus*—April 16, 2 eggs, G.T.K.M.
Stock Dove, *Columba oenas*—Young April 24, G.T.K.M.
Turtle Dove, *Columba turtur*—July 19, 2 eggs, G.T.K.M.; seen May 31,
G.T.K.M.
Pheasant, *Phasianus colchicus*—May 19, 9 eggs, G.T.K.M.
Partridge, *Perdix cinerea*—May 20, 3 eggs.
Quail, *Perdix coturnix*—July 4, 10 eggs, under-gardener of W. E. Mullins,
Esq.
Peewit, *Vanellus cristatus*—April 28, 1 egg, G.T.K.M.; young June 7, C.E.C.
Land Rail, *Gallinula crex*—Song April 26, G.T.K.M.; May 26, 4 eggs, W.H.C.
Water Rail, *Rallus aquaticus*—
Moorhen, *Gallinula chloropus*—April 11, 2 eggs, G.T.K.M.; young May 14,
A.G.T., L.C.O., C.E.C.
Coot, *Fulica atra*—April 30, 2 eggs, G.T.K.M.
Wild Duck, *Anas boschas*—May 19, 11 eggs, G.T.K.M.; young April 30,
G.T.K.M.
Little Grebe, *Podiceps minor*—April 4, 3 eggs, G.T.K.M.; young May 19,
G.T.K.M.
Snipe, *Scolopax gallinago*—Seen end of September, G.T.K.M.



NOTES.

The following notes are extracted from the Society's record book which contains observations made during the last four months of the year 1883.

ORNITHOLOGY.

Dabchick carrying young.—On September 29th I went to visit a nest on which a Dabchick was sitting, in Mr. Dell's meadow, opposite the Priory. The bird was on the nest, and on my approach, she swam off from it, instead of diving, as they generally do. This made me watch her carefully, and I saw that she was carrying one young-one, and I think I could make out two under her wings with only their heads sticking out. She remained on the opposite side watching me. Then one of the young birds fell off the mother's back, but she opened her wing and it quickly scrambled back. I lay down to watch, and presently the male came up. I contrived to get behind a tree. In a short time I showed myself, when the cock dived, and the hen still carrying her young ones, which prevented her from diving, went as close as possible to the other bank. I now crossed to the other side, and by going very quietly surprised the two birds—who dived, and the hen, having left her young ones on the water came up a short distance up stream, and began calling them. They dived, but had not strength to swim far up stream; after swimming three feet, they came up, and made a pitiful chirping. The mother forgot her fears, and came to their rescue, and from half the distance that the river is broad, I saw her open her wings, and take her young-ones under them, and carry them in safety to the other side.

G. T. K. MAURICE.

Flocks of Missel Thrushes.—Missel Thrushes have begun to collect into flocks in the Forest, October 4th.

G. T. K. MAURICE.

Flocks of Starlings.—A large flock of Starlings passed near Manton, flying N.E. at 5.30 p.m., (October 13th. They numbered about 1,000. Query.—Where do these large flocks roost? Are they migrating?

G. T. K. MAURICE.

A large Flock of Starlings was on Marlborough Common on October 29th. I never saw so many together before.

Rev. C. E. THORPE.

Osprey.—About September 26th, Sir Francis Burdett's keeper shot an Osprey at the Broad, Ramsbury.

L. O. MEYRICK.

Sea Gull.—A Sea Gull passed over the field October 20th.

G. H. PROCTER.

Variety of Birds in College Grounds.—I have seen the following birds in the Court, or from the windows of the Adderley Library—Rook, Jackdaw, Starling, Sparrow, Linnet, Green-Finch, Wilding Ducks (on the wing), Plovers (on the wing), Tree-creeper, Great Tit, Wren, Blue Tit, Chaffinch, Spotted Fly-catcher, Black-cap, Blackbird, Thrush, Missel Thrush, Robin, Hedge Sparrow, Kestrel (on wing), House Martin.

G. T. K. MAURICE.

Roller.—I saw a Roller (*Coracias Garrula*) in Savernake Forest, between 3 and 4 p.m., October 21st.

J. W. LLOYD.

Heron.—On Thursday, November 8th, a Heron passed over Rabley Copse, flying north, at 2 p.m.

H. RICHARDSON.

House Martins.—3 or 4 House Martins were flying about the Master's garden between 4 and 5 p.m. on November 4th and again between 9 and 10 a.m. on November 5th.

G. T. K. MAURICE.

Wild Duck and Geese.—Walking along "Treacle Bolly" about 4 p.m. to-day through the snow, I saw a wild Duck (female) on the water out from the Mill; and also noticed a small flock of Geese flying from S.E. to N.W. Later on about 4.45 p.m. I saw two large flights of Ducks flying in the same direction in rapid succession.

December 6th.

J. A. BOURDILLON.

ZOOLOGY.

Water Shrew.—I found to-day a Shrew in Mr. Duck's meadow, with white spots on the head and behind the ears.

October 4th.

G. T. K. MAURICE.

On November 12th, the Rev. C. Soames, Rector of Mildenhall, gave me a Water Shrew. He had found it dead in the road opposite the cottage of a basket maker, and believes it had been brought up from the river with the osiers. No one in the village could remember having seen one before, except the miller, who had noticed one swimming in the river a few days previously, but had never seen any other. Mr. Soames also saw one off Poulton Bridge on October 24th.

H. RICHARDSON.

Centipede.—Wishing to catch a Centipede this evening, which I saw crawling over a stone, I put down on it a lamp I was carrying, but only cut off two of its legs. These kept on moving vigorously for nearly a minute after the amputation.

October 9th.

T. A. PRESTON.

Bats.—At 2.30 p.m., December 3rd, a Bat was flying in circles round the Bowling Green, opposite C House, feeding. Another was similarly engaged on December 1st.

G. SHARP.

Hare Swimming.—A Hare, put up by the Craven Hounds, swam the Kennet, where it broadens out at Chilton Folliat, Ramsbury, on December 25th.

L. O. MEYRICK.

BOTANY.

Strawberries.—I picked a strawberry on November 1st, and a second one on November 13th.

C. E. THORPE.

ASTRONOMY.

Shooting Stars.—At 9.30 this evening, two shooting stars were seen. The first appeared between Perseus and Cassiopeia, passing to the left of Alpherat in Andromeda and so on down to Pisces. The second followed two seconds after the first on exactly the same course.

October 1st.

L. W. BROWNE.

At 9.5 p.m. a very bright shooting star, leaving a train behind it, passed almost due E. to W. at about 45° above the horizon. The train was about 30° in length and lasted a few seconds. A few minutes later a second passed in the same direction, but nearer the Zenith. There was no sound of any kind.

October 6th.

T. A. PRESTON.

Between 8 and 10 p.m. (at different times) almost a shower of shooting stars was visible, chiefly between the constellations of the Great Bear and Perseus. None were specially bright.

October 20th.

L. W. BROWNE.

At 6.37 p.m. a brilliant shooting star of a reddish blue tint passed from Cassiopeia to Ursa Major. It lasted three or four seconds, and consequently was too slow to have a long tail.

C. G. SPENCER.

October 27th.

L. W. BROWNE.

A shooting star, almost as brilliant as that of October 27th, passed from Capella to Taurus, and therefore in exactly the opposite direction to the afore-mentioned one. It had a splendid trail.

November 1st.

L. W. BROWNE.

Mirage.—A few days ago, as I was walking from C House porch about 10 a.m., I noticed the flag staff on the roof cast a distinct shadow in the air, lying apparently horizontally above my head. The brass knob at the top was plainly distinguishable. The sun was very hot, and the atmosphere very thick at the time.

October 24th.

L. W. BROWNE.

ENTOMOLOGY.

Melitea Artemis.—seems to have a habit of shifting its quarters from year to year. In 1882 it was common near the White Horse and in Preshute Meadow. This year none have been found in these localities, but it has appeared in Rabley Copse.

E. K. CHAMBERS.

Variety of *Phleas*.—I found a variety of *Phleas* with row of blue spots inside the outer row of spots on the hind wing; at rest on grass by the side of the Bath road.

E. K. CHAMBERS.

Hilaria cilipes.—On some of the last evenings of May, remarkable swarms of insects appeared in the Wilderness, and were visible hovering over the trees on the Mound, and over the Bathing Place. They were *Hilaria cilipes*, a fly figured by Curtis, who says, "it is to be seen the whole day flying about little swamps and stagnant water." At Mr. Stainton's request the great Russian dipterologist, Osten-Sacken, named the specimens caught, and he says the transformations are unknown, but the larva is supposed to be aquatic.

T. N. HART-SMITH.

Pterophorus Locvii.—I captured to-day a specimen of this Moth, hitherto only taken in the North of England. The white costal cilia are very distinctive.

July 6th.

S. L. MOSELEY.



DONATIONS.

ARCHÆOLOGICAL.

2 Bronze Arrow Heads (Egypt)	S. L. Norris, Esq.; O.M.
Portion of Scaffold from Tower Hill	W. F. H. Blandford.
Flint Implements from Ravo	E. Lloyd, Esq., O.M.
Implements from Lake Dwellings of Switzerland... ..	M. J. Grellet.
„ „ Wangford, Vandricourt, and St.	
Acheul... ..	Dr. J. Evans, F.R.S.

CONCHOLOGICAL.

Collections of 7,000 Shells, embracing 1,482 species	Mrs. Blagg.
Spondylus (Thorny Oyster)—Jamaica	J. A. Lloyd, Esq.
Oliva Hiattula	J. A. Hay.
Bulimus oblongus, egg and fry	Mr. G. B. Sowerby.
Gastrana fragilis	J. A. Hay.
Gnathodon cuneatus... ..	J. A. Hay.
Margarita striata	H. W. Cholmeley.
Navicella porcellana... ..	H. W. Cholmeley.
Tectaria pagoda... ..	H. W. Cholmeley.
Operculum of—?	H. W. Cholmeley.

ENTOMOLOGICAL.

3 P. Actæon (Lulworth Shipper)	Miss A. Thring.
Mosquitoes from Huelva, near Cadiz	L. P. Kekewich, Esq., O.M.
4 Beetles (Egypt)	H. M. Fletcher.
Centipede from Jamaica	Band-master Swayne.
Collection of Beetles	W. F. H. Blandford, Esq., O.M.
Moths from Australia	E. Meyrick, Esq., O.M.

GEOLOGICAL.

Fossil Wood from Lias—Charmouth	W. B. Silver.
Cat's Eye and Carbuncle	J. A. Hay.
Box of Crystals	E. A. F. Stiffe.
Disceras Lonsdalei (Calne)	H. Cunningham, Esq.
Two Large Crystals of Quartz from Snowdon	H. D. Drury, Esq.
Shells from Dirt Bed, Swindon	H. W. Cholmeley.
Bolivian Onyx and Agate from desert of Atacama	H. G. Comber.
Specimen of Pecten in Flint	Mr. Phelps.
Specimens of Crocidolite... ..	Mr. Gregory.

LIBRARY.

Effects of Heat on certain Compounds of Silver, &c.	G. F. Rodwell, Esq.
Eloges Historiques, Cuvier	H. Richardson, Esq.
Among the Indians in Guiana	E. F. in Thurn, Esq.

MISCELLANEOUS.

Pair of Carved Wooden Stirrups—S. America ...	H. G. Comber.
Small Pieces of Coloured Pottery—Chili	H. G. Comber.
Arrow Head, tipped with Squirrel's tooth—	
Amazon	J. A. Wanklyn.
Afghan "Posheen"	Col. Channer.
Map of Wiltshire, 1610	Rev. W. J. V. Baker.
Stamps (various)	G. Lewis.
Maté Cup and Strainer and Gourds from which	
the former are made... ..	H. G. Comber.

NUMISMATIC.

10 Roumanian and other Coins	F. Thoys.
Silver Roman Coin	H. B. Creeke.

ORNITHOLOGICAL.

Peregrine Falcon—mounted	P. Mc K. Coats.
Pie-bald Pheasant	G. H. Dawson, Esq.
New Zealand Owl Parrot and Blue Duck	G. C. Larkworthy, Esq.,
	O.M.
Collection of Eggs from S. America	H. G. Comber.
Shag shot at Mildenhall	H. Cooper, Esq.
Six Birds' Skins from Victoria, Australia	F. C. Webb-Ware.
Three Dab Chicks, killed in Kennet	G. T. K. Maurice.

ZOOLOGICAL.

Skull of Tiger	E. A. Stiffe.
Tooth and part of Back-bone of Shark (New	
York)	H. G. Comber.
2 Snukes and Flying Fish	W. B. Maurice.
Young Water Rat—mounted	G. T. K. Maurice.
Shrew, Rat, Mouse, Field Mouse, Harvest Mouse,	
Grass Mouse	G. T. K. Maurice.
Echidna—Victoria	F. C. Webb-Ware.
Young Crocodile from the Nile	R. A. Waddilove.
Human Skeleton	J. Walker, Esq., M.D.
Ctenocella pectinata (Coral)	H. F. Nicholson.

STANTON PRIZES.

THESE Prizes were founded in memory of T. C. Stanton, who died December 13, 1854, to encourage the study of Natural History and Natural Philosophy.

FORMER PRIZEMEN.

1857 R. Bosworth-Smith.	1874 A. E. Garrod } <i>Aeq.</i>
1858 A. Robinson.	J. G. Melitus }
1859 J. J. Pulleinc.	1875 J. G. Balfour } <i>Aeq.</i>
1860 A. L. Galabin.	E. S. Marshall }
1861 A. L. Galabin.	1876 W. M. H. Milner.
1862 G. A. Dicken.	A. J. Burness.
1863 A. C. Madan.	1877 O. Elton.
1864 A. C. Madan.	1878 H. M. Elder.
1865 T. L. Croome.	1879 G. W. Butler.
1866	1880 P. H. Maddock (Entomological)
1867 W. Goodchild } <i>Aeq.</i>	E. N. Gardiner (Botanical).
I. N. C. Popo }	1881 W. F. H. Blandford (Entomo-
1868 F. Giles.	logical).
1869 J. F. Laver.	E. K. Chambers (Botanical).
1870 J. B. Fuller.	1882 E. F. Benson (Entomological).
1871 J. B. Fuller.	E. K. Chambers (Geological).
1872 E. Meyrick } <i>Aeq.</i>	1883 W. L. Wainwright (Entomolo-
J. B. Oakley }	gical).
1873 J. C. Brown } <i>Aeq.</i>	
W. M. H. Milner }	

SUBJECTS FOR 1884.

The best set of specimens of all kinds wanted for the completion of the Museum Collections, not less than 150 in number, collected in term time at Marlborough.

For further particulars apply to Rev. T. A. Preston.

BALANCE SHEET FOR 1883.

RECEIPTS.

	£	s.	d.
Balance from 1882	86	2	7
Subscriptions	24	14	0
Sale of Reports...	23	9	5
" Almanacs	2	5	8
" Catalogues	1	3	0
" XI Lists	0	8	6
" Maps	0	10	0
" Botanical Paper	0	2	2
For Field Days...	16	11	9
School Tax	42	0	0
	£197	7	1

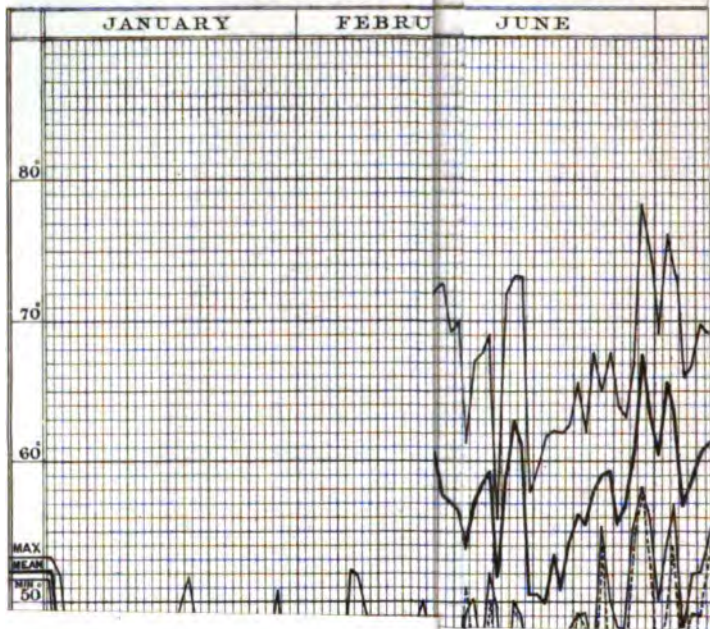
EXPENDITURE.

	£	s.	d.
Subscription to Wilts Archaeological Society	0	10	6
Report, 1883, Printing and Publishing	49	3	6
Lithographing, &c., for Report	12	6	6
Stationery, Papers, and Binding	3	12	6
Ordinary Printing	1	13	6
Stuffing Specimens, &c.	33	7	6
Herbarium Expenses	8	17	5
Field Day	16	11	6
Magic Lantern, Expenses of	2	5	3
Microscope, Expenses of	0	14	6
Barometer	0	2	9
Parcels and Postage	0	17	5
Balance	67	4	3
	£197	7	1

From the Balance of £37 4s. 3d. must be deducted over £60, being the estimated cost of the Report published this Term.

J. P. WAY,
Hon. Treasurer.

HISTORY S



RY St

JANUARY, 1883.

Date.	Mean Readg of Baromtr. reduced to Sea Level.	Temperature.						Wind.			Mean amt. Cloud (0-10)	Rain.
		In the Shade.				Highest insun's rays.	Lowst. on the grass.	Direction.		Velocity Miles.		
		High- est.	Lowest	Adop- ted. Mean.	Dew Point.			A.M.	P.M.			
	in.											in.
1	29.766	53.2	51.7	52.3	49.6	56.0	47.5	S.S.W.	W.S.W.	287	6.5	.21
2	29.708	52.1	42.0	45.8	41.0	74.0	39.5	W.	W.NW	289	6.0	.07
3	30.114	46.6	40.2	42.1	38.1	82.4	35.5	W.NW	N.W.	190	6.0	
4	.164	44.0	37.4	40.8	36.9	50.1	30.7	E.S.E.	S.S.E.	137	10.0	.08
5	.226	47.1	38.5	41.5	39.6	51.3	33.0	S.S.E.	W.NW	136	5.5	.27
6	.487	45.5	31.8	36.2	32.5	80.0	26.0	Calm	Calm	60	1.0	.02
7	.453	38.1	30.9	34.5	31.7	47.5	25.0	E.	E.	76	5.0	
8	30.146	37.5	31.9	34.3	31.9	62.4	28.3	E.	E.	178	8.0	
9	29.666	36.0	32.0	33.7	30.4	70.9	28.3	E.	E.S.E.	311	9.5	.10
10	.546	40.7	32.9	37.9	38.0	46.2	31.9	E.S.E.	E.	237	10.0	.04
11	.605	40.9	38.0	39.4	39.1	46.8	37.7	S.E.	E.	181	10.0	.02
12	.487	38.7	36.2	37.7	37.8	43.9	37.1	S.E.	Calm	126	10.0	.25
13	.340	42.0	38.0	39.8	38.8	46.0	37.0	E.S.E.	E.	158	7.5	.01
14	.495	44.2	34.9	39.6	38.7	78.0	36.0	S.E.	S.	147	10.0	.21
15	.414	47.9	38.1	40.8	38.4	86.3	32.9	S.	E.	152	10.0	.19
16	29.893	47.0	32.8	37.5	34.1	83.4	29.4	W.	N.W.	52	5.0	.01
17	30.122	50.0	34.7	43.9	45.1	71.9	29.2	S.S.W.	S.W.	200	10.0	.11
18	.197	51.8	42.4	46.8	45.8	69.1	35.5	S.W.	Calm	224	10.0	.18
19	.233	48.2	36.9	43.2	41.3	51.4	33.0	S.S.E.	S.W.	176	10.0	.17
20	.288	48.3	44.1	45.6	44.7	56.0	43.9	Calm	E.	129	10.0	.06
21	.412	47.6	41.5	44.0	41.8	59.5	39.3	Calm	S.	89	10.0	
22	.572	42.0	37.1	39.3	35.7	45.9	37.5	Calm	E.	109	10.0	
23	30.564	40.5	32.8	35.2	30.0	86.0	28.9	S.E.	S.	218	1.5	
24	29.981	38.8	31.5	35.7	34.8	45.0	28.0	S.	S.	273	10.0	.39
25	.473	44.8	33.1	38.2	34.4	86.2	29.3	W.	S.	271	5.0	.27
26	.372	45.1	32.2	36.7	29.1	73.4	29.7	W.	W.	294	0.5	.16
27	.656	47.0	32.1	38.7	34.0	61.9	28.9	S.W.	N.W.	335	5.0	.36
28	.983	46.1	33.9	40.4	38.8	83.0	29.6	W.	S.S.W.	296	5.5	.23
29	.547	50.9	39.3	45.2	43.6	55.0	37.0	S.W.	W.SW	365	9.5	.29
30	.675	41.9	33.0	35.6	31.3	94.0	29.7	W.	Calm	117	2.0	.09
31	.500	36.7	28.3	32.5	31.8	45.0	27.3	E.	E.N.E	101	5.0	
Mns.	29.906	44.6	36.1	39.8	37.4	64.1	33.0	...	...	5905	7.2	Sum 3.79

FEBRUARY, 1883.

Date.	Mean Readg. of Barometr. reduced to Sea Level.	Temperature.						Wind.				Mean amt. of Cloud (0-10).	Rain.
		In the Shade.				Highest insun's rays.	Lowest on the grass.	Direction.		Velocity. Miles.			
		High- est.	Lowest	Adop- ted. Mean.	Dew Point.			A.M.	P.M.				
1	ins. 29.426	39.8	31.5	35.5	34.0	54.7	30.8	N.	S.	124	10.0	in.	.75
2	.087	46.8	35.0	40.9	39.4	56.0	33.9	S.	W.	439	10.0	.33	
3	29.751	44.0	35.4	38.3	33.8	91.0	30.8	S.W.	S.S.W.	234	7.5	.02	
4	30.145	48.4	36.1	40.9	37.2	92.2	30.8	W.	S.W.	96	4.5		
5	.177	46.8	36.1	39.8	36.0	90.2	29.9	S.	S.E.	172	4.5		
6	30.000	42.0	32.9	36.7	35.0	86.5	29.3	E.	S.S.E.	166	9.5	.14	
7	29.814	52.2	37.2	43.1	39.9	95.0	34.9	Calm	S.S.E.	202	9.0	.23	
8	.583	51.9	40.2	44.9	41.3	63.8	37.9	Calm	N.W.	162	10.0	.33	
9	.743	49.0	37.2	41.9	37.5	97.8	34.2	W.	S.W.	152	7.5	.07	
10	.412	48.1	39.4	43.7	42.8	56.0	36.7	S.S.W.	WNW	364	5.0	1.13	
11	.692	43.9	37.0	39.6	36.5	89.0	31.7	WSW	S.	164	6.5	.20	
12	.489	46.4	39.3	42.2	37.7	48.4	34.1	S.	S.S.W.	429	5.5	.43	
13	.879	46.7	36.6	40.9	36.9	95.2	31.7	S.W.	S.W.	265	7.5	.12	
14	29.834	47.7	40.0	44.9	43.9	50.1	35.1	S.	S.	445	6.0	.40	
15	30.025	48.3	37.0	41.7	38.9	94.8	34.0	S.S.W.	W.	228	5.0	.20	
16	.496	50.0	30.9	38.0	32.8	95.4	26.9	W.	S.	79	2.5		
17	.236	46.9	35.0	40.3	35.8	67.0	29.3	S.	S.S.W.	304	10.0	.42	
18	.019	48.6	36.1	40.7	37.6	100.4	31.9	NNW	Calm	195	8.0	.01	
19	.222	46.0	33.9	37.7	33.0	94.8	29.5	N.W.	Calm	137	9.0	.05	
20	.327	48.0	33.9	41.9	41.1	58.0	30.8	S.W.	W.	123	10.0		
21	.460	52.1	42.4	48.0	46.7	70.2	30.0	W.	W.	170	10.0	.02	
22	.590	51.8	37.1	43.6	40.0	74.0	30.6	W.	N.W.	203	5.0		
23	.835	50.1	32.3	39.2	34.6	96.3	28.3	WSW	Calm	66	2.0		
24	.728	50.9	32.2	42.1	41.5	94.9	28.9	W.	N.W.	152	10.0		
25	.708	51.1	40.0	43.5	39.3	97.8	34.9	S.	Calm	71	7.0		
26	.631	47.4	35.0	39.7	36.8	92.0	29.6	S.S.W.	S.W.	104	10.0		
27	.505	49.9	36.5	42.7	39.6	92.9	32.9	WNW	Calm	134	10.0	.01	
28	30.532	52.7	41.9	46.0	43.8	85.3	37.3	W.	Calm	65	5.0	.04	
Mns	30.084	48.1	36.4	41.4	38.3	81.4	32.3	...	...	5445	7.4	Sum 6.50	

MARCH, 1882.

Date.	Mean Readg. of Baromtr. reduced to Sea Level.	Temperature.						Wind.			Mean. amt. of Cloud (0-10).	Rain.
		In the Shade.				Highest insun's rays.	Lowest on the grass.	Direction.		Velocity. Miles.		
		High- est.	Lowest	Adop- ted Mean.	Dew Point.			A.M.	P.M.			
1	ins. 30.526	50.9	40.1	45.3	40.7	103.8	35.4	E.N.E.	E.	162	9.0	in.
2	.645	43.8	35.0	38.4	34.6	92.0	30.2	E.	E.	125	9.0	
3	.698	49.0	30.1	38.5	31.5	94.9	27.3	E.	E.	120	0.0	
4	.708	48.8	29.2	38.4	33.1	97.3	26.8	E.	E.	91	0.0	
5	.566	55.2	30.0	40.9	35.8	97.9	27.7	NNW	N.	92	0.5	
6	30.251	42.5	29.6	35.2	31.5	84.9	26.9	N.	N.	294	9.0	
7	29.990	37.0	28.1	31.6	21.5	73.5	26.3	N.	N.	295	8.0	.03
8	29.893	35.1	25.4	28.9	22.5	91.4	26.0	NNE	N.	255	3.5	
9	30.009	33.9	23.7	27.5	21.6	92.5	23.0	N.E.	Calm	198	1.0	
10	29.911	34.8	20.8	27.6	18.4	93.9	17.9	N.E.	Calm	124	0.5	
11	.755	40.0	21.2	31.4	25.4	78.1	21.8	NNW	NNW	157	9.0	.02
12	29.977	40.3	24.0	31.2	20.9	90.0	20.4	N.	N.	153	0.0	
13	30.005	44.0	22.5	33.7	28.4	98.9	20.1	W.	W.	96	7.5	.03
14	29.724	45.5	32.9	36.6	32.4	102.2	28.7	Calm	Calm	53	5.0	
15	.681	37.8	27.4	31.3	22.1	94.6	25.2	E.	Calm	158	4.5	
16	.598	40.2	21.7	31.9	27.5	88.0	22.1	W.	N.W.	103	2.0	
17	.556	46.9	30.9	37.6	32.5	102.8	27.7	W.	Calm	113	7.0	.02
18	.681	44.0	27.3	33.9	26.7	106.7	21.7	S.W.	Calm	86	0.0	
19	.793	40.1	21.4	31.7	30.7	85.1	18.9	Calm	N.	90	9.0	.54
20	.645	40.0	32.1	35.9	34.5	51.0	31.8	E.	E.	181	10.0	
21	29.721	37.9	33.2	35.4	31.5	52.1	32.9	E.	E.S.E.	262	10.0	
22	30.133	33.7	28.2	30.1	16.6	93.8	26.9	E.	E.	413	9.0	
23	30.171	38.8	25.1	30.3	15.6	94.7	23.0	E.	E.	372	0.5	
24	29.971	47.0	18.5	32.4	24.7	100.4	16.0	N.W.	N.E.	137	5.5	
25	.628	44.7	23.5	35.2	27.1	96.9	24.9	N.	S.W.	115	5.0	.06
26	.334	46.0	27.3	34.2	28.6	102.5	29.8	N.	Calm	118	1.5	.05
27	29.713	42.8	22.4	32.4	28.3	96.3	20.0	N.	Calm	75	0.0	.02
28	30.158	43.7	26.2	34.9	28.6	99.6	23.7	N.	Calm	78	0.5	
29	29.921	46.1	27.3	38.7	34.4	91.0	21.8	S.	S.	281	9.5	.29
30	29.508	51.3	39.0	43.9	40.2	96.8	33.9	S.S.W.	W.	345	5.0	.23
31	29.031	54.0	32.1	42.7	35.4	110.6	25.9	S.W.	N.W.	59	1.5	
Mna.	29.964	43.1	27.6	34.8	28.5	92.1	25.3	...	...	5201	4.6	Sum 1.29

APRIL, 1883.

Date.	Mean Readg. of Baromtr. reduced to Sea Level.	Temperature.						Wind.				Mean amt. of Cloud (0-10)	Rain.
		In the Shade.				Highest insun's rays.	Lowst. on the grass.	Direction.		Velocity. Miles.			
		High- est.	Lowest	Adop- ted Mean.	Dew Point.			A.M.	P.M.				
1	ins. 30.294	53.6	30.2	40.3	32.2	104.7	24.4	E.	Calm		76	4.0	in.
2	.095	59.2	30.4	45.7	39.9	110.5	26.8	Calm	S.S.E.		129	4.5	
3	.247	61.2	41.0	50.4	45.4	112.7	34.9	W.	Calm		40	5.0	
4	.260	63.0	41.6	50.2	42.5	118.0	37.6	W.	Calm		35	5.0	
5	.296	65.0	32.9	50.2	42.9	122.9	29.7	Calm	Calm		44	4.5	
6	.593	56.2	40.7	45.3	35.1	109.2	37.2	E.	Calm		202	4.5	
7	.629	54.8	33.2	42.9	35.4	110.9	33.9	E.	Calm		80	3.5	
8	.535	54.1	28.9	41.5	35.8	107.6	25.9	E.	Calm		78	2.0	
9	.395	61.4	27.1	45.3	35.2	103.0	27.0	Calm	Calm		51	0.0	
10	.436	50.3	36.5	42.1	34.2	112.5	32.3	N.E.	Calm		113	2.5	
11	.344	58.9	28.7	45.2	38.9	102.6	27.3	Calm	Calm		57	0.5	
12	30.179	55.2	36.0	46.1	40.6	97.3	29.1	N.	Calm		80	10.0	.01
13	29.880	46.9	41.4	43.1	40.1	53.7	42.0	S.W.	W.		83	10.0	.13
14	.899	56.8	41.4	46.9	40.5	115.4	39.3	N.	N.W.		75	2.5	
15	29.923	55.0	38.2	47.0	43.2	105.6	36.6	W.	W.		117	10.0	
16	30.097	51.2	36.1	43.3	34.9	102.6	29.9	W.	Calm		126	3.0	
17	29.899	51.0	31.1	43.5	37.6	101.7	25.1	S.S.W.	S.		166	9.5	
18	.510	55.9	42.2	48.3	42.6	103.2	37.0	S.	S.		402	9.0	.18
19	29.742	53.5	42.1	45.8	40.4	101.8	38.9	Calm	Calm		61	10.0	.06
20	30.140	59.0	36.3	48.4	42.0	117.5	30.9	N.	E.		86	3.0	
21	.272	50.2	37.3	43.3	38.1	98.2	33.5	N.E.	N.E.		143	10.0	
22	30.171	51.1	34.8	42.6	34.3	117.9	31.2	E.	E.		196	4.0	.02
23	29.833	45.0	32.0	37.4	33.5	112.7	32.3	E.	N.E.		239	10.0	.08
24	.646	48.3	31.9	38.7	33.6	104.8	30.6	N.E.	N.		168	4.5	.03
25	.686	52.0	33.0	42.5	36.3	110.7	29.2	Calm	S.W.		82	0.5	.02
26	.629	55.3	34.5	47.7	39.3	102.8	29.9	S.S.E.	S.E.		238	7.0	.09
27	.386	54.7	46.3	50.4	47.4	86.8	43.4	S.E.	S.E.		260	10.0	.24
28	.437	58.7	47.0	52.2	48.4	105.7	44.9	E.	Calm		71	10.0	.07
29	.533	61.0	47.2	51.7	44.0	118.7	45.5	Calm	Calm		64	9.5	
30	29.712	58.2	38.2	48.6	41.2	119.6	32.2	S.W.	Calm		79	4.5	
Mns	30.024	55.2	36.6	45.6	39.2	106.4	33.3	...	...		3641	5.8	Sum 0.93

MAY, 1883.

Date.	Mean Readg of Baromtr. reduced to Sea Level.	Temperature.						Wind.			Mean amt. Cloud (0-10)	Rain. in.
		In the Shade.				Highest insun's rays.	Lowest on the grass.	Direction.		Velocity Miles.		
		High- est.	Lowest	Adop- ted. Mean.	Dew Point.			A.M.	P.M.			
1	in. 29·814	57·8	43·3	48·4	40·7	105·7	37·9	E.N.E	E.	188	7·0	
2	·944	48·1	40·2	43·0	34·9	93·8	38·8	N.E.	Calm	166	10·0	
3	·874	51·3	34·2	43·0	34·3	106·6	30·2	N.	N.E.	98	9·5	·08
4	·891	47·9	29·1	38·5	32·3	112·7	24·5	N.E.		115	3·5	
5	·877	51·2	30·1	40·4	36·0	115·9	26·1		E.	75	8·0	
6	·874	61·2	41·1	48·8	42·2	114·8	39·6	N.E.	N.E.	247	8·5	·05
7	·690	55·4	41·2	45·6	40·6	106·7	34·6	E.	Calm	185	5·0	·21
8	·571	49·3	33·9	43·4	41·7	81·0	30·1	Calm	Calm	31	10·0	·01
9	·573	45·2	38·8	42·2	38·7	70·8	33·9	E.	E.N.E.	99	10·0	·33
10	·718	45·1	33·0	37·8	36·3	79·3	31·8	Calm	Calm	112	8·0	·14
11	·930	49·9	34·2	43·2	39·5	106·4	29·6	W.	S.	100	8·5	·58
12	·862	55·7	40·3	49·4	49·7	81·9	40·9	S.W.	S.W.	294	10·0	·01
13	·913	63·9	49·9	56·2	49·5	121·5	48·8	S.W.	S.W.	349	7·0	·08
14	29·935	58·1	50·9	53·8	51·0	96·8	49·0	S.W.		179	10·0	·05
15	30·150	63·9	47·4	57·3	50·1	122·7	44·4		Calm	42	6·5	·01
16	·325	69·1	50·2	60·1	50·6	125·9	45·1	E.	N.E.	109	3·5	
17	·366	69·9	46·7	58·9	49·9	121·0	41·0	Calm	Calm	52	10·0	
18	·247	61·4	48·0	54·2	43·6	123·5	46·0	N.	Calm	111	8·0	
19	·076	58·2	45·5	51·8	45·6	103·2	43·8	N.W.		156	10·0	
20	·085	57·9	48·6	52·7	50·9	97·7	47·7	W.	Calm	52	10·0	·04
21	·198	63·1	48·6	54·3	46·7	116·0	50·2			80	10·0	
22	·176	71·1	49·1	57·4	47·7	123·7	45·1		Calm	67	0·5	
23	·157	71·1	47·9	59·3	49·9	123·9	40·9	W.SW		83	0·0	
24	30·108	70·2	43·3	57·3	49·4	124·5	38·8	W.	Calm	87	0·0	
25	29·837	65·9	41·4	56·5	52·4	112·7	38·0		Calm	22	4·5	·22
26	29·711	58·0	50·0	52·2	50·0	72·1	47·4	Calm		79	10·0	·28
27	30·028	62·8	38·3	52·9	43·2	125·1	32·7	N.	Calm	71	3·5	
28	·056	64·3	43·2	55·5	48·0	125·8	39·4	S.W.	S.W.	174	9·0	
29	·055	62·3	49·6	54·4	48·3	114·7	47·4	S.S.W.		204	10·0	·01
30	·234	66·8	40·2	53·2	44·3	127·6	32·9	W.	Calm	70	3·0	·01
31	30·196	66·8	39·1	54·2	45·0	127·0	36·7	S.		133	0·5	
Mns.	29·983	59·4	42·5	50·8	44·6	109·1	39·1	...	...	3825	6·9	Sum 2·00

JUNE, 1883.

Date.	Mean Readg. of Baromtr. reduced to Sea Level.	Temperature.						Wind.				Mean amt. of Cloud (0-10).	Rain.
		In the Shade.				Highest insun's rays.	Lowst. on the grass.	Direction.		Velocity. Miles.			
		High- est.	Lowest	Adop- ted. Mean.	Dew Point.			A.M.	P.M.				
1	ins. 30·037	68·0	49·1	58·4	49·0	135·6	43·8	S.	Calm	187	2·5	in	
2	·136	71·1	42·4	58·7	49·7	133·7	38·8	N.	Calm	49	1·0		
3	30·131	72·2	49·0	60·8	48·7	124·6	40·3	E.	E.	186	0·0		
4	29·970	72·7	45·0	57·7	50·1	122·7	41·9	E.	E.	277	5·0		
5	·847	69·2	46·6	57·0	47·2	121·9	43·1	E.	N.E.	286	0·0		
6	·815	70·0	43·2	56·7	48·5	123·3	39·9	E.	Calm	174	5·0	·07	
7	·773	61·3	49·4	53·9	50·4	122·5	51·0	Calm	Calm	27	10·0	·01	
8	·818	67·1	50·3	56·9	49·3	123·5	46·1	S.S.E.	Calm	91	5·5		
9	29·914	67·8	46·4	58·4	52·8	120·7	41·3	E.	E.	61	10·0	·08	
10	30·007	69·0	52·1	59·4	53·3	123·6	50·0	Calm	N.	71	10·0	·02	
11	·216	55·8	49·6	51·6	47·7	77·2	43·2	E.	Calm	89	5·0		
12	·351	72·1	41·2	58·9	51·4	134·2	36·0	N.	WNW	28	3·0		
13	·393	73·2	50·1	63·0	55·4	127·6	45·1	N.	Calm	110	6·5		
14	30·242	73·1	49·1	61·1	53·2	133·4	45·1	W.	Calm	75	7·5	·04	
15	29·896	57·7	44·8	50·4	47·5	86·0	42·7	W.	Calm	98	6·0	·11	
16	·903	60·0	43·2	50·4	42·8	121·0	39·1	NNW	Calm	121	3·0	·08	
17	·981	61·9	37·2	49·9	43·5	134·5	33·5	WNW	Calm	104	6·5		
18	·972	62·2	43·4	53·5	46·4	125·6	39·1	Calm	N.	72	9·5	·01	
19	·921	62·0	38·2	50·8	44·2	129·6	33·9	N.	Calm	98	10·0	·19	
20	·843	62·5	48·3	54·2	48·8	123·7	46·1	S.	Calm	148	9·5	·23	
21	29·929	65·7	49·1	56·3	50·3	132·6	40·1	Calm	N.E.	47	8·5	·31	
22	30·016	62·1	49·2	55·5	51·0	104·2	48·3	S.S.W.	Calm	149	6·5	·02	
23	30·012	67·9	46·0	57·9	52·9	131·6	43·0	S.	S.	123	8·5	·01	
24	29·937	65·1	55·6	59·0	53·5	108·5	54·0	S.S.W.	S.S.W.	198	10·0	·04	
25	·805	67·8	50·2	59·3	51·3	131·6	44·9	S.W.	Calm	107	9·0		
26	·812	63·9	48·4	55·6	48·0	129·7	45·1	WSW	W.	123	6·0	0·9	
27	·849	63·1	48·2	57·0	52·2	119·5	44·2	S.W.	S.	240	9·5	·42	
28	·937	67·0	55·4	60·7	57·5	125·4	55·1	S.W.	S.W.	287	10·0		
29	29·980	78·3	58·3	67·7	60·0	134·7	58·1	S.	Calm	166	8·0	·01	
30	30·052	74·6	56·0	63·1	56·6	134·6	53·0	W.	W.	93	5·0		
Mns	29·983	66·8	47·8	57·1	50·4	123·2	44·5	...	...	3885	6·6	Sum 1·74	

JULY, 1883.

Date.	Mean Readg. of Baromtr. reduced to Sea Level.	Temperature.						Wind.			Mean amt. of Cloud (0-10)	Rain.
		In the Shade.				Lowst. on the grass.	Direction.		Velocity. Miles.			
		High- est.	Lowest	Adop- ted Mean.	Dew Point.		Highst insun's rays.	A.M.		P.M.		
1	ins. 30°106	69.2	50.2	60.4	53.9	130.6	45.2	S.W.	S.	142	5.5	in.
2	30°009	76.4	54.0	65.7	56.6	133.6	49.3	S.S.E.	S.	217	9.5	.63
3	29°892	73.2	57.1	63.3	53.7	130.1	54.0	N.	S.S.W.	105	4.0	
4	.825	66.0	48.3	56.8	51.4	128.8	47.0	S.	S.	174	6.0	
5	.876	66.7	52.1	58.5	52.0	124.5	49.4	S.W.	S.	226	9.5	.02
6	.821	69.9	52.1	60.8	52.6	137.1	49.0	S.S.E.	S.S.W.	190	9.5	.11
7	.852	69.2	55.6	61.3	55.7	131.8	55.0	S.W.	S.W.	196	10.0	.02
8	.837	69.2	55.6	61.7	56.1	131.5	54.7	S.W.	S.	195	9.0	.16
9	.879	67.2	53.5	58.5	53.6	116.8	50.5	W.	Calm	182	5.5	
10	.890	68.7	49.7	60.1	53.3	127.9	46.0	W.	S.	116	8.5	.01
11	.618	67.1	55.1	59.3	54.5	127.7	53.3	S.W.	S.W.	294	10.0	.12
12	.549	61.1	54.5	56.6	53.8	105.8	50.7	S.W.	S.W.	256	8.5	.10
13	.725	67.0	51.1	58.3	52.5	128.5	46.1	W S W	W.	151	7.0	.10
14	.797	62.0	50.2	55.4	49.2	123.7	44.1	Calm	N.W.	60	8.0	.05
15	29°948	61.1	42.0	52.4	44.7	121.9	34.8	W N W	Calm	105	3.0	.29
16	30°188	62.1	39.8	53.1	49.8	119.6	34.9	N.W.	Calm	101	10.0	
17	30°058	61.2	52.3	56.4	51.1	112.8	49.9	W.	N N W	175	8.5	
18	29°947	63.0	45.4	55.5	48.8	119.9	38.7	N N W	Calm	102	9.0	
19	.800	64.1	43.0	54.9	49.4	120.5	39.0	W.	Calm	46	8.0	.06
20	.698	57.4	47.4	53.3	53.1	83.0	44.4	S.	S.W.	73	10.0	.57
21	.649	62.1	50.3	54.9	47.0	125.7	49.0	Calm	N.	186	10.0	.27
22	.879	61.5	46.7	53.4	47.6	123.7	43.9	N.W.	S.W.	163	9.0	.05
23	.796	59.8	49.3	55.2	51.9	104.7	47.9	S.W.	N.W.	119	9.5	.75
24	29°861	64.0	49.5	55.5	49.2	123.5	48.7	N.	N.	100	3.5	
25	30°031	63.8	46.3	55.5	47.4	130.4	43.0	N.	N.	90	7.5	
26	.153	68.1	48.2	57.3	49.1	132.4	45.8	N.	N.	92	8.0	
27	.201	65.2	46.4	57.0	51.2	124.3	43.9	N.	Calm	92	8.5	
28	30°126	72.1	46.3	58.2	52.8	125.4	41.6	N N W	N.	97	5.5	
29	29°847	66.2	45.0	56.8	52.6	121.3	40.6	S.W.	S.	103	9.0	.25
30	.617	65.8	52.5	58.3	54.0	131.5	52.7	S.W.	Calm	98	6.0	
31	29°792	68.2	52.5	60.1	53.6	126.0	49.1	N.	N.W.	113	4.5	.11
Mns	29°880	65.8	49.7	57.6	51.7	123.4	46.5	...	...	4309	7.7	Sum 3.67

AUGUST, 1883.

Date.	Mean Readg. of Baromtr. reduced to Sea Level.	Temperature.						Wind.			Mean amt. of Cloud (0-10).	Rain.
		In the Shade.				Highest insun's rays.	Lowst on the grass.	Direction.		Velo city. Miles.		
		High- est.	Lowest	Adop- ted Mean.	Dew Point.			A.M.	P.M.			
1	ins. 30·082	64·7	48·6	56·8	51·7	117·4	45·9	N.W.	N.W.	75	6·5	in.
2	·206	72·3	48·0	61·4	55·2	132·6	42·5	N.W.	N.W.	68	6·0	
3	·245	67·3	54·9	60·9	56·6	113·7	51·2	N.	N.W.	53	9·0	·01
4	·233	73·9	56·3	62·2	56·1	127·7	52·5	N.W.	N.W.	69	9·5	
5	30·106	65·3	56·5	60·3	58·2	87·5	57·7	W.	N.W.	91	10·0	·04
6	29·962	64·9	55·3	59·2	54·6	122·9	52·5	N.W.	N.W.	80	8·0	·05
7	30·014	70·1	49·6	57·7	50·4	128·8	45·7	N.W.	N.	97	5·5	
8	29·751	59·8	48·2	56·6	53·1	83·8	44·2	S.W.	N.W.	239	9·0	·49
9	·671	63·9	51·0	56·6	48·7	124·7	47·4	W.	N.W.	160	4·0	
10	·678	63·7	48·2	55·0	50·0	126·9	43·9	W.	W.	212	6·0	·03
11	29·993	64·1	49·5	56·5	50·3	115·7	44·2	W.	W.	128	2·0	
12	30·143	66·2	43·9	57·6	51·5	125·4	40·1	S.	S.	97	6·0	
13	29·905	75·7	53·3	63·4	55·4	126·3	49·2	S.W.	S.	208	1·5	
14	·728	69·2	57·6	62·1	55·2	127·8	54·0	W.	S.	308	5·0	·03
15	29·772	64·9	53·9	57·8	51·6	131·2	52·1	W.	W.	207	8·0	·02
16	30·078	64·7	49·9	55·8	48·6	122·3	46·6	N.W.	W.	122	7·5	·02
17	·064	67·7	52·6	60·3	59·5	92·1	49·6	S.W.	W.	102	10·0	
18	·229	74·1	54·8	62·3	54·3	123·8	49·5	N.	W.	78	2·5	
19	·243	74·3	43·3	61·8	53·6	126·4	42·1	N.E.	S.	52	3·0	
20	·130	74·2	47·8	62·2	56·2	126·8	42·4	E.	S.W.	115	5·0	
21	·198	74·9	57·1	64·9	58·3	126·6	56·0	N.E.	N.W.	57	2·0	
22	·227	67·0	54·6	60·1	56·0	95·0	51·4	N.W.	N.	44	5·5	·02
23	·306	71·3	45·1	58·6	52·5	121·7	39·0	N.	N.E.	59	0·5	
24	·268	73·3	46·2	60·0	53·0	122·3	42·3	N.E.	S.E.	26	0·0	
25	·174	74·3	44·8	57·6	53·9	122·6	38·6	E.	E.	52	5·0	
26	·153	75·5	46·0	61·7	55·5	128·7	42·1	W.	N.W.	52	1·5	
27	30·084	75·4	52·2	63·2	57·7	127·2	47·0	S.W.	N.W.	84	7·0	
28	29·978	71·9	55·9	62·2	58·8	123·5	52·5	W.	W.	109	2·5	·03
29	·901	69·3	55·7	61·4	59·2	123·5	51·7	W.	W.	151	3·0	
30	·889	67·9	55·5	60·3	56·4	118·7	51·7	W.	W.	148	9·5	·05
31	29·714	61·9	50·7	56·3	55·1	95·7	43·3	S.W.	N.W.	65	9·5	·18
Mns.	30·036	69·1	51·2	59·8	54·4	119·0	47·4	...	...	3405	5·5	Sum 0·97

SEPTEMBER, 1883.

Date.	Mean Readg of Baromtr. reduced to Sea Level.	Temperature.						Wind.			Mean amt. of Cloud (0-10).	Rain.
		In the Shade.				Highest insun's rays.	Lowst. on the grass.	Direction.		Velocity Miles.		
		High- est.	Lowest	Adop- ted. Mean.	Dew Point.			A.M.	P.M.			
	in.											in.
1	29.339	62.1	50.7	57.2	54.0	113.6	46.8	S.W.	S.	202	7.5	.73
2	28.853	60.1	54.9	56.9	54.1	91.0	53.5	S.	W.	452	10.0	.62
3	29.504	63.0	51.7	55.3	50.6	121.9	51.5	W.SW	W.	236	9.5	.04
4	.796	62.2	43.3	53.2	47.5	118.7	39.3	WNW	Calm	101	8.5	.07
5	.965	60.1	46.7	51.3	46.3	116.5	44.1	N.	N.	100	3.5	.01
6	.985	58.9	41.3	49.2	45.9	87.9	37.7	S.W.	N.W.	104	5.0	.02
7	29.943	60.0	46.5	53.5	46.9	118.0	41.4	W.	N.W.	98	10.0	
8	30.005	67.9	46.2	54.6	49.2	132.5	42.7	W.	Calm	163	5.0	
9	30.108	65.5	36.6	53.6	49.2	118.0	34.2	E.S.E.	S.E.	90	3.0	.11
10	29.912	59.9	52.3	56.9	56.8	78.0	47.1	S.	Calm	180	10.0	.56
11	30.127	58.0	49.9	52.7	49.2	61.8	46.1	N.	N.	177	10.0	.02
12	.221	61.6	52.0	54.8	51.7	98.3	46.5	E.N.E	Calm	62	9.5	
13	.252	66.2	49.3	55.4	52.0	108.2	45.6	E.N.E	Calm	68	5.0	
14	.092	67.0	49.3	57.1	52.9	118.9	45.1	E.S.E.	Calm	105	10.0	.01
15	.015	66.1	51.1	55.5	50.8	119.7	48.2	N.	Calm	49	5.0	
16	.194	70.1	47.2	56.0	51.9	115.8	44.9	Calm	Calm	17	8.0	
17	.208	73.0	46.2	60.6	57.2	119.9	42.1	E.	Calm	50	5.5	
18	.205	69.1	53.2	58.2	54.0	117.8	49.2	Calm	Calm	64	5.0	
19	30.029	68.1	51.2	58.3	53.4	118.5	46.9	E.S.E.	S.E.	88	9.5	.03
20	29.732	64.9	53.5	56.9	53.2	113.6	46.2	E.	N.W.	134	6.0	.40
21	.732	62.2	50.3	54.2	51.2	105.1	43.1	W.	Calm	31	5.5	.01
22	29.807	61.0	49.3	54.1	51.2	105.9	44.1	E.N.E	Calm	37	6.0	
23	30.034	64.0	41.7	53.2	51.8	111.9	41.1	Calm	S.S.E.	81	9.0	.57
24	29.675	65.0	54.6	58.8	56.5	112.7	51.9	S.W.	WSW	264	10.0	.04
25	.857	67.1	51.8	57.9	52.2	122.8	47.0	W.	Calm	131	3.5	.26
26	.682	65.1	51.6	58.1	54.1	125.6	44.0	S.W.	S.W.	257	4.0	
27	.690	60.9	49.3	54.1	49.1	101.7	44.5	S.W.	W.	197	4.5	.09
28	.563	61.3	47.2	55.2	52.0	115.9	42.1	N.W.	W.	131	6.0	.25
29	.302	57.0	43.4	50.1	45.4	114.9	39.2	W.SW	N.	149	9.0	.34
30	.545	50.2	46.3	48.3	43.8	67.1	45.2	N.	N.	340	10.0	.02
Mns.	29.846	63.3	48.6	55.0	51.2	108.9	44.7	...	...	4185	7.1	Sum 4.20

OCTOBER, 1883.

Date.	Mean Readg. of Barometr. reduced to Sea Level.	Temperature.						Wind.				Mean. amt. of Cloud (0.10).	Rain.
		In the Shade.				Highest insun's rays.	Lowst on the grass.	Direction.		Vlocity. Miles.			
		High- est.	Lowest	Adop- ted Mean.	Dew Point.			A.M.	P.M.				
	ins.												in.
1	29.881	52.8	39.7	44.7	38.2	102.2	33.4	N.	N.	192	1.0		
2	30.042	55.1	34.0	45.2	40.1	113.7	27.8	N.	N.W.	120	5.5	.16	
3	29.625	47.3	38.3	42.5	40.1	89.8	34.7	W.	N.W.	86	5.0	.51	
4	29.818	53.9	36.1	46.7	42.5	99.2	29.6	N.	N.	294	8.0		
5	30.166	54.4	38.3	46.4	41.5	104.1	32.2	N.N.W.	NNW.	155	6.0	.03	
6	.346	54.5	37.2	44.7	39.9	106.8	28.9	E.N.E.	Calm	65	0.0		
7	.481	57.4	35.9	47.8	45.9	110.8	28.4	N.	Calm	46	8.0		
8	.535	58.8	52.1	55.1	53.1	71.2	50.8	N.E.	Calm	37	10.0	.01	
9	.342	59.2	47.6	51.8	49.1	109.4	42.1	S.W.	Calm	45	5.0		
10	30.019	62.1	42.4	51.3	49.2	111.6	39.5	Calm	Calm	27	8.0		
11	29.938	62.0	44.4	52.5	48.8	110.6	41.2	Calm	N.	50	7.5		
12	30.091	57.3	42.6	48.0	43.1	109.7	38.9	E.	Calm	85	4.5		
13	30.036	60.3	41.2	50.9	49.7	106.6	36.0	S.	S.	106	10.0		
14	29.787	61.0	51.2	55.4	51.1	106.8	47.1	S.S.W.	W.	331	9.0	.53	
15	.647	56.8	44.4	50.9	47.4	111.9	39.8	WSW.	S.	177	5.3	.94	
16	.408	58.2	46.3	52.5	48.6	109.5	45.0	S.W.	S.	354	2.5	.08	
17	29.530	57.0	44.7	49.1	42.6	104.7	41.0	W.	W.	299	6.5	.11	
18	30.060	54.3	40.1	46.6	40.9	101.5	33.3	W.	W.	179	5.0	.07	
19	29.861	55.0	45.1	48.3	44.3	58.1	40.5	S.W.	W.	192	9.5	.18	
20	.761	51.1	36.9	42.1	37.6	97.8	31.9	WSW.	W.	76	4.0	.05	
21	29.906	56.2	35.9	44.1	39.0	105.4	31.7	W.	Calm	68	10.0		
22	30.053	49.2	33.7	41.3	38.3	95.0	28.9	N.W.	S.W.	38	0.0	.18	
23	29.769	55.1	40.3	47.7	45.2	86.0	33.8	WSW.	Calm	180	10.0	.12	
24	.822	55.3	38.2	48.8	49.3	81.9	29.9	WSW.	N.W.	118	9.5	.04	
25	.879	57.8	54.0	55.6	53.7	70.5	49.3	WSW.	S.W.	249	10.0	.08	
26	29.998	58.6	52.2	54.3	51.5	106.7	50.0	S.W.	S.	176	8.0	.02	
27	30.127	61.1	44.0	50.7	47.7	109.3	37.9	W.	Calm	59	5.0		
28	.196	56.4	39.8	47.4	45.6	96.8	35.9	E.	E.	64	4.5	.01	
29	.281	53.4	45.4	50.6	50.7	61.3	38.0	E.N.E.	E.N.E.	70	10.0		
30	.456	53.3	45.7	48.6	46.1	62.0	44.9	E.	E.	84	10.0		
31	30.298	49.0	45.3	47.2	43.9	57.1	45.0	S.E.	E.	44	10.0		
Mns.	30.005	55.9	42.4	48.7	45.4	95.7	37.7	...	...	4066	6.4	Sum 3.12	

NOVEMBER, 1883.

Date.	Mean Readg. of Baromtr. reduced to Sea Level.	Temperature.						Wind.				Mean amt. of Cloud (0-10).	Rain.
		In the Shade.				Highest insun's rays.	Lowst. on the grass.	Direction.		Velocity. Miles.			
		High- est.	Lowest	Adop- ted. Mean.	Dew Point.			A.M.	P.M.				
1	ins. 30.285	50.3	37.2	42.7	39.7	71.2	31.9	E.	Calm	27	5.0	in.	
2	.134	47.9	33.2	41.3	41.3	61.0	31.7	E.S.E.	Calm	33	5.0		
3	30.094	48.6	39.7	43.7	42.4	61.0	33.5	Calm	N.	24	10.0	.01	
4	29.767	51.2	31.9	41.9	39.7	53.7	27.7	S.W.	W.	178	5.0	.36	
5	.535	48.3	38.2	43.5	41.3	78.1	32.5	W.	S.S.E.	148	6.0	.60	
6	.231	53.2	38.4	45.4	43.9	65.0	33.7	WSW	W.	237	5.0	.09	
7	.598	49.1	30.2	38.2	36.4	92.1	27.9	E.	Calm	44	9.0	.10	
8	.718	50.2	32.1	40.8	39.8	94.0	29.8	Calm	S.S.W.	83	6.0	.11	
9	.724	50.2	38.0	43.9	41.7	84.9	31.3	W.	W.	132	9.5	.04	
10	.742	47.2	36.1	40.2	36.6	91.2	32.8	W.	W.	160	3.5		
11	.789	45.1	33.3	39.0	38.1	61.0	28.7	W.	E.	101	9.5	.05	
12	29.889	45.0	29.8	35.6	32.2	89.0	24.9	N.E.	Calm	33	4.5		
13	30.155	43.9	26.0	32.9	29.4	77.9	24.0	N.	N.	33	0.0		
14	30.238	44.0	26.1	33.7	30.3	82.0	22.0	N.E.	N.W.	47	5.5		
15	29.958	40.2	23.4	32.9	32.9	55.0	19.8	E.	S.	62	7.5	.56	
16	.768	46.7	40.1	43.1	40.7	62.0	36.2	W.	W.	190	9.5		
17	.821	47.1	34.0	39.7	35.9	69.5	28.1	S.W.	W.	180	5.0	.25	
18	.953	49.9	30.2	41.2	39.4	85.1	25.2	W.	S.W.	131	9.0	.08	
19	29.985	50.7	36.1	42.4	39.0	90.0	29.1	WSW	S.W.	127	1.5	.37	
20	30.032	48.1	36.2	41.4	37.9	83.2	30.9	W.	W.	222	4.5	.02	
21	29.967	50.4	35.3	43.2	40.6	85.1	29.9	S.W.	WSW	208	5.5	.10	
22	.774	45.1	39.1	42.2	39.1	55.1	34.5	S.W.	W.	159	10.0	.38	
23	.836	47.0	32.1	37.4	34.0	84.0	28.9	W.	S.W.	83	4.0	.25	
24	.449	49.3	36.1	44.7	45.2	84.0	30.8	WSW	S.W.	268	5.5	.29	
25	.142	52.3	45.3	48.8	45.5	88.0	39.9	S.W.	S.W.	397	10.0	.27	
26	29.307	49.1	37.1	41.9	38.2	82.0	30.1	S.W.	W.	212	3.5	.02	
27	30.017	48.7	36.0	42.9	40.9	82.8	29.3	W.	S.	132	7.0		
28	.330	54.1	47.3	49.9	47.8	66.2	41.5	S.W.	S.W.	244	9.5		
29	.341	48.9	40.4	43.7	41.2	81.1	36.0	S.	S.W.	177	6.5		
30	30.212	51.0	40.3	44.5	42.0	83.0	33.7	W.	N.	166	10.0	.22	
Mns	29.860	48.4	35.3	41.4	39.1	76.6	30.5	...	...	4238	6.4	Sum 4.17	

DECEMBER, 1883.

Date.	Mean Readg. of Baromtr. reduced to Sea Level.	Temperature.						Wind.				Mean amt. of Cloud (0-10)	Rain.
		In the Shade.				Highest insun's rays.	Lowst. on the grass.	Direction.		Velocity. Miles.			
		Highest.	Lowest	Adop- ted Mean.	Dew Point.			A.M.	P.M.				
1	ins. 30.391	43.3	34.5	38.3	35.1	59.0	29.9	N.	N.W.	239	6.0		in.
2	30.352	46.1	33.9	39.7	36.8	62.0	28.9	W.	W.	64	10.0	.05	
3	29.832	50.9	37.2	45.1	43.2	53.0	35.7	W S W	N.	193	9.0		
4	29.940	49.7	34.4	38.8	30.7	77.2	29.7	N.W.	W.	381	2.0		
5	30.203	38.9	29.3	32.4	27.6	65.0	23.9	N.	W.	124	0.0		
6	.301	33.9	25.4	30.1	22.7	68.0	21.7	N.	N.	190	8.5	.04	
7	.622	36.5	26.1	30.0	21.9	76.0	20.0	N.	N.	135	6.0		
8	.498	34.6	26.2	31.3	27.7	42.1	22.1	N N W	N.	48	10.0		
9	30.252	37.9	30.2	34.6	33.0	47.0	27.7	S.W.	S.W.	67	10.0	.06	
10	29.864	44.9	37.2	42.2	41.7	52.2	33.3	S.W.	S.W.	176	10.0	.20	
11	.728	48.0	39.7	43.2	39.8	80.1	32.6	W.	S.W.	236	7.0	.16	
12	.993	49.2	37.3	41.5	33.2	63.0	32.5	N N W	Calm	344	6.5	.01	
13	.960	51.3	37.2	47.2	47.1	60.1	33.1	W N W	N.W.	244	10.0	.16	
14	.773	51.4	41.3	46.2	42.6	56.1	35.6	W S.W	N.W.	256	5.5	.06	
15	.738	43.1	35.1	38.4	35.2	53.3	30.0	S.W.	N.W.	168	7.0	.18	
16	29.985	38.9	33.5	35.6	29.8	70.2	29.6	N.	N.	309	4.5		
17	30.446	37.0	30.5	32.8	27.5	64.9	26.3	N.	N.	238	2.5		
18	.418	37.7	30.1	34.4	32.8	46.5	25.5	W N W	W.	72	10.0	.01	
19	.354	41.2	32.5	35.8	33.1	61.5	26.1	W.	Calm	93	4.0		
20	30.046	45.2	33.0	40.9	40.8	50.9	28.0	W.	W.	96	10.0		
21	29.937	48.7	40.2	44.3	41.2	85.0	34.1	W.	W.	106	9.5		
22	29.953	48.9	39.3	44.0	40.4	81.9	33.8	S.W.	S.W.	185	9.0	.01	
23	30.379	47.0	31.8	36.4	32.7	57.1	26.1	Calm	Calm	88	9.5		
24	.567	46.9	32.9	42.4	44.3	50.2	30.9	W S.W.	W.	89	10.0	.01	
25	.608	45.1	35.1	38.4	36.5	49.0	36.8	N.	Calm	42	10.0	.01	
26	.540	41.2	32.9	37.1	37.1	45.0	33.9	S.E.	Calm	57	10.0	.02	
27	.414	40.0	35.5	37.6	37.5	42.0	36.9	E.	Calm	48	10.0	.02	
28	.331	45.8	37.9	41.3	40.2	63.8	33.9	Calm	Calm	26	10.0		
29	.259	46.9	40.3	42.7	41.4	50.3	41.1	Calm	Calm	21	9.5	.02	
30	.423	40.9	36.1	37.9	34.8	41.6	36.2	N.E.	N.E.	113	10.0		
31	30.489	36.8	33.0	34.5	29.5	38.8	33.0	E.	E.	200	10.0		
Mns.	30.213	43.5	34.2	38.6	35.4	58.5	30.6	...	...	4648	7.9	Sum 1.02	

1883.

SUMMARY.

Month.	Degree of Humidity (Saturation=100).	Temperature.					Wind.										Rain.				
		In the Shade.				Adopted Mean.	Dew Point.	Direction.						Amount of Cloud.	No. of Days it fell.	Amount Collected.					
		Highest.	Lowest.	Mean of all the Highest.	Mean of all the Lowest.			S.W.	S.E.	E.	N.E.	N.	W.				N.W.	Calm.	Velocity.		
		ins.						Mean of all the Highest in the Sun's rays.	Mean of all the Lowest on the Grass.												ins.
January	94	29-906	28-3	44-6	36-1	39-8	37-4	64-1	33-0	0	1	14	8	10	4	8	5905	7-2	24		3-79
February	92	30-084	30-9	48-1	36-4	41-4	38-3	81-4	32-3	1	0	1	2	14	11	13	6	8	19		5-50
March	82	29-964	18-5	43-1	27-6	34-8	28-5	92-1	25-3	15	4	16	0	3	3	5	5	11	10		1-29
April	80	30-024	27-1	55-2	36-6	45-6	39-2	106-4	33-3	4	5	9	4	5	3	6	1	23	11		0-93
May	80	29-983	29-1	59-4	42-5	50-8	44-6	109-1	39-1	5	8	8	1	6	9	6	2	17	15		2-00
June	79	29-983	37-2	66-8	47-8	57-1	50-4	123-2	44-5	8	2	9	1	8	6	5	1	20	17		1-74
July	82	29-880	39-8	65-8	49-7	57-6	51-7	123-4	46-5	12	0	0	1	11	16	6	7	9	18		3-57
August	84	30-035	43-3	69-2	51-2	59-8	54-4	119-0	47-4	5	4	3	1	5	6	19	19	0	12		0-97
September	90	29-846	36-6	63-3	48-6	55-0	51-2	108-9	44-7	8	2	5	4	3	8	10	4	16	20		4-20
October	90	30-005	33-7	55-9	42-4	48-7	45-4	95-7	37-7	8	3	7	1	6	9	12	5	11	17		3-12
November	93	29-860	23-4	48-4	35-3	41-4	39-1	76-6	30-5	4	2	5	1	4	16	21	1	6	20		4-17
December	91	30-213	25-4	43-5	34-2	38-6	35-4	58-5	30-6	13	2	3	1	0	10	15	7	11	16		1-02
Year	86	29-982	18-5	55-3	40-7	47-6	43-0	96-5	37-1	83	33	80	25	75	104	128	62	140	199		32-40

THE WEATHER, 1883.

JANUARY.

The weather during the month was very unsettled, and consequently the Barometer very fluctuating. Though on the whole high, it twice fell very rapidly, from the 6th to the 13th, and again from the 22nd to the 26th, accompanied on each occasion with rather violent gales.

As regards the temperature, it was very similar to that of January 1882, the maximum temperature not being very remarkable, but the minimum temperature especially high. The minimum on the 1st was $53^{\circ}7'$, an unprecedentedly high minimum for January; and the average minimum ($36^{\circ}0'$) has only been exceeded in warmth in 1873 ($36^{\circ}2'$) and in 1875 ($39^{\circ}5'$). It fell below freezing point only five times, and in each case, except perhaps the last, to a very small amount.

The mean temperature for the month was $39^{\circ}8'$, not very remarkable, but the range of temperature each day was often very small. The maximum in the sun was seven times above $80^{\circ}0'$, the average temperature being $64^{\circ}1'$; in 1869 it was $65^{\circ}4'$; in 1875, $64^{\circ}1'$; in 1877, $66^{\circ}0'$; and in 1878, $65^{\circ}3'$. There were 16 ground frosts, almost all very slight, as the average temperature on the grass was $33^{\circ}0'$, only exceeded in warmth in 1875 ($37^{\circ}3'$) and in 1877 ($33^{\circ}6'$).

Sunshine has not been plentiful, though there were 52.70 hours as against 29.27 last year, out of a possible maximum of 259.20 hours. There were 14 absolutely sunless days.

But the month was most remarkable for its exceeding dampness. Without any large amount falling at one time, the moisture from one shower had not dried before a second came, and thus the repeated small showers, coming upon ground already sodden in December, rendered agricultural operations all but impossible. But it must not be supposed that the total amount of rain or the number of rainy days has been unusually great.

Since 1865 the rainfall for January has been nine times greater than, and once nearly as great as, it was this year; in 1872 the fall was as much as 6.84 inches, and in 1868 and 1877 5.34 and 5.65 inches respectively. So again the maximum fall this year was 0.39 inch, whereas in every previous year, except 1870 and 1880, it was far greater, in four years (1873, 1876, 1879, and 1881) being over 1 inch, and in three of these over 1.5 inches. The number of rainy days was 24 in 1882, whereas it was 27 in 1872 and 28 in 1877; so that if rainfall alone be considered, the month cannot be considered without precedent.

FEBRUARY.

The unsettled weather of the last seven days of January continued (with a small break on the 3rd, 4th, and 5th) till the 17th of February. During this time the rainfall was very heavy, no less than 6 inches (one-sixth of the total for the whole year) falling in less than three weeks, and though the weather was very mild, farming operations were quite suspended. The floods in many parts of the country were very serious, and the ground was everywhere perfectly sodden. On the 18th the weather quite changed, and for the rest of the month was unusually bright, though with cool bracing winds.

Temperature, on the whole, was very uniform, though not unprecedently so. There were 16 ground frosts; but only two, and those very slight, at a height of 4 feet above the ground. Bright sunshine was about one-third of the greatest possible maximum; 92 hours as compared with only 48 hours last year. This caused the temperature in the sun to be unusually high, the mean being 81.4° , the highest mean for February yet recorded here.

Wind was generally southerly or westerly, very high at the beginning of the month, but almost calm during the last ten days of it.

Highest maximum, 52.9° ; lowest maximum, 36.5° ; mean maximum, 48.1° ; highest minimum, 42.4° ; lowest minimum, 30.9° ; mean minimum, 36.4° ; mean temperature of the month, 41.4° .

MARCH.

The month was remarkable for its unusual cold and dryness, which, however unpleasant to man and beast, were of great benefit to agriculture. The ground, except in some low lying districts, was well dried and pulverised, and farmers were able to make up in a great measure for lost time. Vegetation, however, suffered greatly. Most of the growth had been cut down, and only in sheltered places had it been able to survive the cold, and even then without making the slightest progress. Fortunately vegetation was not very far advanced by the end of February, and the real loss was not so very great.

The barometer, which at the beginning of the month was remarkably high, began to fall on the 5th, and until the 20th kept low, but fairly uniform. For the last ten days it was extremely variable, rising and falling with great rapidity.

The maximum temperature kept very low throughout the month; just at the beginning and end it rose above 50.0° , but at other times it was more frequently below than above 40.0° . The mean for the month was only 43.1° ,

and that for the previous 18 years 48.5° . In 1865 it was 43.0° , and in 1867 41.7° , the only occasions on which it has been below the mean for this year.

The minimum temperature was only seven times above freezing point, the average for the month being 27.6° , whilst that for the previous 18 years was 34.0° . Only once before, in 1865 (when it was 29.1°), has the mean minimum for March been even below 30.0° . The maximum temperature in the sun was 110.6° , and the mean 92.1° . There were 167.6 hours of bright sunshine, as against 162.2 hours last year, and only 2 absolutely sunless days.

The minimum temperature on grass was only twice above freezing point (on the 1st and 30th), and though the temperature has occasionally been lower than 16.0° (the minimum for this year), yet the mean for the month was only 25.4° , as against 29.2° , the average for the previous 18 years.

The mean temperature of the month was, therefore, as might have been expected, the coldest which has been registered here. It was only 34.8° , the average of previous years being 40.4° .

APRIL.

The first half of the month was very dry (not a drop of rain falling in most places except on the 13th) and with a very small amount of wind, which on two occasions moved over only one mile in 12 hours, and at other times seldom more than one mile an hour. The latter half of the month was very different; rain fell frequently, though in very small quantities, and the wind was at times very high; on the 18th it travelled more than 400 miles in the 24 hours, and was sufficiently strong to blow a Rook's nest out of its tree; on the 23rd hail and snow showers were frequent. Singular as it may seem, the temperature has been but very slightly different from the mean of the previous 18 years, in fact the mean temperature of the month was only $\frac{1}{2}^{\circ}$ below it. There have been rather more frosts than usual at a height of 4 feet above the ground, but considerably fewer ground frosts, in former years temperatures below 20.0° not being at all unusual and in 1868 one as low as 9.9° . The temperature in the sun has been above the mean, and the amount of cloud much less than usual. There were 173 hours of bright sunshine as against 166 in 1882.

Small as was the amount of rain, it was not unprecedented; in 1863, there was only 0.97 inch on 9 days; in 1870, 0.55 inch on 2 days; in 1881, 0.87 inch on 10 days; whilst in 1883 there was 0.93 inch on 11 days.

Vegetation has been very backward; seldom had the country appeared so wintry at the end of April as it did this year, but a few damp warm days

would have produced a wonderful change. The cold east winds destroyed much of the wall fruit, but apples and pears, being very late in blooming, so far escaped.

	Highest in previous years.	Lowest in previous years.	Mean of previous 18 years.	1883.
Mean max. in shade	64·3° (1875)	50·4° (1879)	55·8°	55·2°
„ min. in shade	41·4° (1871)	34·1° (1870)	38·4°	36·6°
„ temp. in sun	117·7° (1870)	92·3° (1877)	104·4°	106·4°
„ temp. on grass	38·5° (1871,4)	25·3° (1870)	32·9°	33·3°
„ temp. of month	50·9° (1865)	42·2° (1879)	46·1°	45·6°

MAY.

The ungenial weather of April continued till about the 12th May, during which time the temperature was very low, twice (on the 4th and 5th) falling below freezing point at a height of 4 feet above the ground, and six times below freezing on the ground. On the morning of the 5th snow fell, on the 10th it fell at intervals throughout the day, and on the 11th hail showers were not unfrequent. The mean temperature of the 4th was only 38·5, and of the 10th 37·8; such low temperatures are very unusual in May. Throughout this time rain fell frequently, but generally in very small quantities, though that on the 11th was in most places the heaviest fall for the month.

After the 12th a great change occurred; the minimum temperature was decidedly high, and the maximum was often very high, but it was very fluctuating. From the 19th to the 21st was a very dull cloudy period, with scarcely any sunshine or rain. The 26th was also sunless, but wet, and on these two occasions the maximum temperature was low. The consequence was that the cold of the first part of the month was fairly compensated by the heat of the latter part, so that the temperature of the month as a whole was about that usually experienced in May.

The mean maximum temperature in the sun was only 109·1°; once only before has it been so low, viz., in 1877, when it was 105·3°. There were 178½ hours of bright sunshine, as against 255½ in 1882.

Till about the middle of the month vegetation was very backward, but the warm weather produced a wonderful change, and before the end of the month it had recovered itself in a great measure. The rain on the 26th was especially beneficial, and pushed on the grass, so that a fair hay crop might be expected.

JUNE.

The first 14 days of the month were very fine and warm, except the 11th, when there was very little sunshine and the temperature consequently fell considerably. From the 15th to the 28th was a cold, unsettled period, with frequent showers, and though there was a certain amount of sunshine every day, the nights (especially at the beginning) were chilly, the terrestrial thermometer on the night of the 17th falling to within $2^{\circ}0'$ of freezing point. The last two days of the month were very fine. As has been so often the case, the cold of the latter half of the month counteracted the heat of the first part, and hence the mean temperature of the month was not very different from that of the previous 18 years.

Max. in the shade	78°3	Mean	Max. 66°8	Mean of 18 years	66°8
Min. in the shade	37°2	„	Min. 47°9	„	47°9
Max. in the sun...	135°6	„	Max. 123°2	„	124°7
Min. on grass.....	33°5	„	Min. 44°5	„	43°2
Mean temperature of month.....	57°1	„	„	„	56°3

Bright sunshine 189 hours, amount in June, 1882, 150·8 hours. Rainfall considerably below the mean.

The month, as a whole, was favourable to vegetation. Blight of all kinds, was, as a rule, not noticeable anywhere. Strawberries plentiful, though rather wanting in flavour, apples abundant, pears and plums none; garden flowers of all kinds have flowered profusely, and it will probably prove to be one of the best rose years on record.

Corn was not quite so good as at the end of May, though varying much according to soil, and very short in the straw. Hay crop light, but fairly well secured.

JULY.

The month opened with very warm weather, but during the night between the 2nd and 3rd, the county was visited by a very severe thunderstorm, doing much damage in some places. The temperature then fell considerably, and on the 13th and 14th, storms visited the neighbourhood, lowering the temperature still more, and on the 15th a heavy hailstorm not only quite chilled the air, but also damaged gardens (both flower and fruit) to a great extent. The minimum temperature then registered $39^{\circ}8'$ ($34^{\circ}8'$ on the ground), almost the coldest temperature ever experienced in July since 1865. (It was $39^{\circ}7'$, $39^{\circ}2'$, and $39^{\circ}6'$ in 1867, and $38^{\circ}8'$ in 1868). Temperature still continued low till just the end of the month, the maximum on the 20th being only $57^{\circ}4'$, the lowest maximum yet recorded in July. The mean temperature for the month was therefore decidedly low, only $57^{\circ}6'$ (it was $57^{\circ}2'$ in 1867, $57^{\circ}5'$ in 1871, and $57^{\circ}49'$ in 1879). The temperature in the sun has not been quite so

abnormal, though it has been decidedly colder than usual. There were $156\frac{1}{2}$ hours of bright sunshine, against 186 in 1882, and $245\frac{1}{2}$ in 1881; the average daily amount of bright sunshine was therefore a little over 5 hours, the 20th was the only absolutely sunless day, but on three other days there was less than 2 hours' sunshine.

Temperature.	Highest.	Lowest.	Mean for month.
Maximum	$76\cdot4^{\circ}$ (2)	$57\cdot4^{\circ}$ (20)	$65\cdot8^{\circ}$
Minimum	$57\cdot3^{\circ}$ (3)	$39\cdot8^{\circ}$ (16)	$49\cdot8^{\circ}$
Terrestrial.....	$55\cdot0^{\circ}$ (7)	$34\cdot8^{\circ}$ (15)	$46\cdot5^{\circ}$
Mean	$65\cdot7^{\circ}$ (2)	$52\cdot4^{\circ}$ (15)	$57\cdot6^{\circ}$

Notwithstanding the frequent storms, the Barometer was very steady, the total range for the month being only $0\cdot687$ inch.

AUGUST.

The month was noteworthy for its remarkably small amount of rain (only one quarter of the average amount) and for the great daily range of temperature, it being at one time very nearly $32\cdot0^{\circ}$ in 24 hours, and not unfrequently very nearly $30\cdot0^{\circ}$ at others. The mean daily temperature has, however, been very uniform, the extreme variation not exceeding $10\cdot0^{\circ}$ throughout the month, the cold of the day being balanced by the warmth of the night and *vice versa*. The Barometer has been very high and steady, the extreme variation for the month being only $0\cdot68$ inch and the mean only exceeded once before, in 1875.

The maximum temperature in the shade was $75\cdot7^{\circ}$, almost the lowest maximum for August during the past 18 years (it was $74\cdot8^{\circ}$ in 1866, and $74\cdot6^{\circ}$ in 1878), temperatures above $80\cdot0^{\circ}$ being not uncommon in August, whilst in 1876 it was as high as $92\cdot0^{\circ}$. The mean maximum was $69\ 1^{\circ}$, within $0\cdot1^{\circ}$ of the average mean maximum of the previous 18 years.

The minimum temperature in the shade was $43\cdot3^{\circ}$, a very high minimum (it has been 14 times out of the 18 lower than it was this year, and as low as $32\cdot4^{\circ}$ in 1869), whilst the mean minimum was $51\cdot2^{\circ}$, curiously only $0\cdot1^{\circ}$ higher than the average mean minimum of the previous 18 years.

The maximum temperature in the sun was $132\cdot6^{\circ}$, a decidedly low temperature, in 3 years only was there a lower maximum. The mean maximum was only $119\cdot0^{\circ}$. The minimum on grass was $38\cdot6^{\circ}$, the mean $47\cdot4^{\circ}$, only exceeded in warmth six times previously.

The mean temperature of the month was $59\cdot8^{\circ}$, the average of the previous 18 years being $59\cdot1^{\circ}$, so that the month as a whole fairly maintained its proper temperature.

There were $184\frac{1}{2}$ hours of bright sunshine, as against $176\frac{1}{2}$ in 1882, and 154 in 1881.

SEPTEMBER.

The month opened with very rough, stormy weather, heavy rain and high wind. From the 10th to the 20th the weather was fine and dry, with very little wind, and consequently thick fogs in the early mornings; and for the last ten days it was wet, windy and decidedly chilly, more, however, from absence of heat than intensity of cold. The Barometer fluctuated a good deal, varying from 28·73 inches on the 2nd to 30·28 inches on the 13th, a range of 1·55 inches. During the last week it kept on falling very steadily, and only rose to its average height on the 30th. The mean reading for the month was 29·85 inches, lower than that of the previous six years, but higher than that of the preceding twelve years, except 1876.

The maximum temperature was 73·0°, on the 17th, the only time it rose above 70·0°; and the mean maximum 63·3°, lower than the mean of the previous 18 years, which was 64·5°. In 1865 the mean maximum was 73·4°, and the absolute maximum 82·5°. The maximum temperature this year on the 30th was only 50·2°.

The minimum temperature was as high as 54·9° on the 2nd, but was only 36·6° on the 9th, in fact the fluctuations of the minimum temperature have been extraordinary at times, 36·6° on one day and 52·3° the next. Notwithstanding this, the mean minimum (48·7°) was above the average mean minimum of the previous 18 years (47·5°).

The minimum temperature on grass has naturally been equally variable, the lowest minimum being 34·2° on the 9th. The mean minimum was 44·7°, only exceeded in warmth twice before, in 1875 (47·0°) and in 1876 (45·1°).

The mean maximum in the sun was 108·2°, by no means a high value, having been lower only five times before during the last 18 years. There were 122 hours of bright sunshine, as against 137 in 1882, and 118·6 in 1881.

The mean temperature of the month was 55·0°, that of the previous 18 years being 55·3°

OCTOBER.

The first seven days were cold with ground frosts on no less than four nights and rather heavy rain on the 3rd, but the next six days were fine and warm. Very heavy rain fell on the 14th and 15th, and up to the 26th more or less rain fell almost every day; this was also a cold period, the temperature falling steadily up to the 22nd, when the minimum was as low as 33·7°, the lowest during the month; but after this it rose rapidly till on the 25th it was unusually warm, the minimum on that day being as much as 54·0°, though the maximum was not more than 57·8°. The last few days of the month were damp and foggy, with very little wind and a steadily falling temperature. Both the pressure of the air and the temperature have therefore varied a

good deal; the extreme variation of the Barometer was 1.193 inches, which took place in only eight days.

The maximum temperature in the shade was 62.1° on the 10th, and it was 4 times above 60.0° during the month. The mean maximum was 55.9°, exactly the average of that of the previous 18 years.

The minimum temperature was 33.7°, on the 22nd, but three days afterwards it was as much as 54.0°. The mean minimum was 42.4°, the average of the previous 18 years being 41.1°, and during that time being 13 times lower than it was this year. The minimum temperature was five times above 50.0°, and did not once sink down to freezing point, a circumstance which has happened only once in the previous 18 years, viz., in 1874, when, however, it was nine times above 50.0°; even in 1876, the hottest October since 1835, it once fell to freezing point and was 12 times above 50.0°. In fact October this year may be considered, as far as minimum temperature is concerned, one of the warmest Octobers we have had.

The maximum temperature in the sun was 113.7° on the 2nd, and the mean solar temperature 95.7°. The average for the 18 years was 90.3°, and was higher in only two previous Octobers.

There were 90½ hours of bright sunshine, and seven absolutely sunless days; as against 133 hours in 1881 and 73 in 1882.

The minimum temperature on grass was 27.8° on the 2nd, and it was eight times below freezing. The mean minimum temperature was 37.7°, having been only six times higher in the previous 17 years. As the temperature not unfrequently falls below 20.0° in October (in 1881 it was as low as 14.6°), October, 1883, must be considered decidedly warm.

The mean temperature of the month was 48.7°, exactly the same as in 1882. The average of the previous 18 years is 48.0°, and has been only 5 times higher than it was this year.

	Highest.	Lowest.	Mean.	Mean of previous 18 years.
Maximum	62.1°	47.3°	55.9°	55.9°
Minimum	54.0°	33.7°	42.4°	41.1°
Solar temperature ..	113.7°	57.1°	95.7°	90.3°
Terrestrial	50.8°	27.8°	37.7°	45.8°
Mean temperature...	53.6°	37.1°	48.7°	48.0°

The monthly travel of the wind was 4066 miles, giving an average of 131 miles per day; the greatest amount on any one day was 354 miles on the 16th, and the lowest, 27 miles on the 10th; it was less than 100 miles on 16 days.

The mean temperature of the earth at a depth of 6 inches was 50.2° , at 12 inches 51.4° , at 18 inches 52.3° , and at 24 inches 53.0° . The cold periods from the 2nd to the 7th, and from the 18th to the 25th considerably affected the ground temperatures.

NOVEMBER.

Speaking generally, the month was warm, dull, and damp, with but little wind or sunshine. The temperature fell considerably from the 10th to the 15th, on which day it reached its minimum, 23.4° ; but it immediately began to rise very rapidly, so that the minimum on the next day was 40.1° , a difference of nearly 17.0° . With the exception of a slight drop on the 22nd, the temperature kept on rising so that the latter half of the month was warmer than the former. Had it not been for the very cold period alluded to, the month would have been singularly warm; as it was, the mean temperature was precisely the same (41.4°) as the average of that of the previous 18 years.

The Barometer kept high throughout the month, with the exception of two deep depressions of short duration, one on the 6th, when it was wet, the other on the 25th, when there was a rather strong S.W. wind. As a rule, however, the wind was very light, its rate having been scarcely more than 1 mile an hour on two days, and under 2 miles an hour on 5 other days; it exceeded 200 miles in the 24 hours on only 6 days.

Though the actual maximum temperature was only 54.1° , and had only been as low in 3 previous years, it never fell below 40.0° , which has only happened 4 times before, consequently the mean maximum has been above the average.

The minimum temperature has often been exceeded, having been as low as 15.8° in 1880; but it has seldom been so few times (only 7) below 32.0° ; in only 4 out of the previous 18 years have we had so little frost. On the other hand, it has rarely been so continuously below 40.0° ; for, except on the 16th (when it was 40.1°) it never rose above 40.0° till the last 3 days of the month. The mean minimum is therefore rather below the average.

	1883.	Mean 1883.	Average of previous 18 years.
Maximum temperature	54.1°	48.4°	47.8°
Minimum temperature	23.4°	35.3°	35.6°
Mean temperature	41.4°		41.4°
Minimum on Ground	19.8°	30.5°	30.6°

There has been very little sunshine, 67 hours, as against 88 in 1882 and 62 in 1881. There were 5 absolutely sunless days, and the total amount for 5 other days was only $\frac{1}{2}$ an hour.

The ground temperatures fell steadily till the 16th and continued low till the 23rd, when they began to rise, but very irregularly. Even at the coldest period, the temperature 6 inches below the surface only sank to 35° ; that at two feet was never below 43° . There were 20 frosts on the ground.

During the last week of the month the sunsets were magnificent, the "afterglow" lasting for upwards of an hour. The true cause of this has yet to be discovered.

DECEMBER.

The month as a whole was mild, dull, and damp; but not to any remarkable degree. From the 5th to the 10th was a cold period, and the mean temperature during that time was low, being below 32° on the 6th, 7th, and 8th, but otherwise the season was mild for the time of year. The absolute maximum temperature was seldom so low, and the absolute minimum seldom so high as this year, and yet the mean maximum is higher, and the mean minimum lower than the average of the previous 18 years, but not to any great extent.

Sunshine was very scarce; there were no less than 17 absolutely sunless days, and only 12 minutes' sunshine during the last 8 days of the month; but this was better than last year, when we had only 23 hours, though in 1881 there were $50\frac{1}{2}$.

Rainfall was very slight, just over one inch during the whole month. In 1873 there was 0.88 inch, but we have twice had over $5\frac{1}{2}$ in. in December, so that the rainfall this year is remarkably small. Still there were not unfrequently fogs, very dense during the last week, and these made the air damp and ungenial.

	1883.	Mean for Month	Average of previous years.
Maximum Temperature.....	51°	43°	43°
Minimum Temperature.....	25°	34°	36°
Mean Temperature.....		38°	38.3°



BOY ENTERED JANUARY, 1876—1883.

No.	Name.	Form.	Age.	Height.	Weight.	Chest.	Head.	Leg.	Arm.
			Years.	in. inc.	lbs. inc.	in. inc.	in. inc.	in. inc.	in. inc.
460	Buckland, A.V....	vi	19-5	71-4 0-9	163-7 8-7				

BOYS ENTERED JANUARY, 1877—1883.

159	Bacon, J.S.F. ...	vi	18-1	67-6 3-1	143-8 21-8	30-8 1-0	22-8 0-3	14-2 0-7	9-4 0-7
28	Hobhouse, L.T....	vi	18-6	70-0 4-2	147-7 26-7	31-5 3-3	22-3 0-3	13-0 0-6	11-0 1-5
54	Wood, H.E.	vi	18-3	69-3 1-2	142-0 14-0	30-3 0-3	21-2 —	13-2 0-7	9-4 0-4

BOYS ENTERED JANUARY, 1878—1883.

310	Blandford, W.F.H.	vi	18-3	71-3 0-5	174-5 9-5				
563	Buckland, E.H....	Up. v	18-9	68-6 0-9	147-2 8-9				
81	Chambers, E.K....	Up. v	17-0	69-7 2-1	143-8 9-8				
435	DeChair, F.B.C..	vi	18-0	70-4 0-6	180-0 7-5				
344	Elam, E.S.	M. v	17-0	66-5 0-9	132-3 2-3				
272	Gabbett, E.	M. U. 1	18-1	63-7 1-3	133-0 14-0				
56	Harvey, P.O.M....	vi	18-8	69-8 0-1	166-0 5-2				
57	Harvey, J.M. ...	vi	17-3	65-0 2-4	134-3 14-5				
269	Hay, C.G.	Up. Sh. (a)	17-5	67-5 3-6	132-7 25-5	2 years' increase.			
303	Hemaley, W.J....	vi	18-5	71-5 1-8	161-5 10-5				
347	Hockin, H.V.	vi	19-1	70-2 0-8	150-0 8-0				
290	Jones, R.D.	vi	19-2	69-0 -0-8	141-2 6-7				
46	Rowe, F.E.	vi	18-4	66-7 0-4	153-5 1-0				
184	Watson, A.H. ...	Up. v	18-10	69-0 0-4	144-0 4-5				

BOYS ENTERED JANUARY, 1879—1883.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
506	Arnold, W.R. ...	M. U. 1	17-7	66-6 0-1	154-0 9-0	33-8 1-3	22-1 —	13-4 0-5	10-7 0-4
361	Bett, H.O.....	Up. Sh. (a)	15-10	68-2 5-1	138-3 29-3	31-5 2-3	21-8 0-8	13-6 1-5	9-6 1-3
63	Bridges, T.O. ...	Up. iv. (a)	14-7	60-4 4-2	98-0 18-0	28-9 1-3	21-6 0-1	11-2 1-0	7-5 0-6
35	Buchanan, T.G...	Up. v	17-1	67-9 4-6	140-2 24-7	30-4 1-4	21-2 0-1	13-5 0-4	8-9 0-7
490	Cheales, J.P.....	Up. v	17-4	65-0 2-1	141-8 11-8	35-7 4-2	22-5 0-3	13-8 0-3	11-3 1-3
304	Chepnell, C.H. ...	Up. v	18-11	67-4 8-3	137-0 10-5	32-3 1-8	22-3 0-7	13-8 0-8	10-0 0-8
23	Dalry, B.H.R....	vi	18-0	70-7 0-8	159-8 8-3	32-8 1-4	22-1 0-3	13-8 -0-2	10-2 0-4
283	Davis, H.J.	Up. Sh. (b)	15-11	69-6	160-0	32-5	21-7	14-2	10-8
275	Ellershaw, E. ...	L. v 2	15-3	64-1 5-7	125-5 25-5	30-2 3-2	21-2 0-2	12-2 0-8	10-2 1-9
32	Hardy, W.E.....	L. v 1	17-1	65-9 4-9	137-0 28-0	31-0 2-5	21-9 0-2	13-2 0-8	9-4 1-4
61	Hartley, C.	Up. v	18-1	67-4 2-9	151-0 24-5	34-2 3-0	21-7 0-3	13-5 -1-1	10-5 1-3
571	Keeling, H.T. ...	M. U 1	17-11	69-3 1-5	172-0 19-0	34-0 3-0	21-6 0-1	14-8 1-0	11-4 1-1
190	Laurence, P.J. ...	M. L. 1	16-1	65-5 5-1	134-0 31-8	31-1 1-4	21-1 -0-6	13-1 1-1	8-8 1-1
143	Maurice, G.T.K..	M. U. 2	16-0	70-3 5-4	137-5 29-0	31-2 2-2	21-6 0-3	12-5 0-5	8-7 0-7
5	Parr, T.H.....	vi	18-4	67-6 5-1	138-8 27-8	30-5 1-3	21-8 0-2	13-1 1-1	9-8 1-6
2	Poynton, A.B. ...	vi	15-9	62-8 5-9	112-2 28-7	28-8 2-8	21-5 0-4	12-0 0-3	8-7 1-0
150	Prescott, H.M....	Up. Sh. (b)	17-0	70-3 5-0	142-7 27-7	33-5 4-8	22-9 0-3	13-0 1-1	10-0 1-2
66	Puroell, A.H.d'O.	Up. v	17-7	70-0 5-0	151-2 28-7	33-5 3-2	22-6 0-1	13-6 0-8	10-0 1-0

BOYS ENTERED JANUARY, 1880—1883.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.
165	Adams, A.	L. v 2	17-6	66-2 2-6	131-5 18-5
6	Alington, H.T.G.	Up. v	16-11	63-4 0-7	131-8 8-0
404	Anderson, C.M....	L. v 1	16-5	66-2 4-2	112-2 12-2
387	Atlay, G.W.	Up. iv	15-0	61-1 3-6	107-7 14-2
198	Bankee, V.A. ...	M. L. 2	14-8	64-1 3-2	112-2 12-2
392	Bliss, F.H.	M. iv	15-0	60-7 3-4	98-5 16-0
131	Browne, L.W. ...	Up. Sh. (b)	14-7	61-1 2-3	105-0 5-0
96	Brownjohn, A.D.	M. v	16-7	69-2 2-0	135-7 5-7
49	Bullock, L.C.W....	vi	16-7	67-5 3-7	124-0 13-0
155	Carwardine, H.T.	M. L. 1	15-10	60-1 3-1	105-7 13-7
93	Cholmeley, W.F.	Up. Sh. (b)	16-5	64-1 2-9	127-0 17-0
103	Clark, H.A.	M. v	16-4	64-9 2-9	120-2 14-7
520	Clarke, L.J.	L. v 1	17-5	63-7 2-0	131-7 9-7
110	Eardley-Wilmot, E.	M. U. 1	14-6	65-7 4-0	107-0 12-0
594	Everett, D.	Up. iv (a)	16-8	66-2 3-7	118-0 11-2
92	Foyster, H.O.B....	M. v	17-0	61-8 2-3	105-8 10-3
284	Horton-Smith, P.	L. v 2	15-3	59-4 2-4	97-0 7-0
592	Hulbert, J.	M. v	16-6	65-7 3-0	141-5 20-5
211	Isacke, R.H.	M. v	16-8	59-5 2-8	92-2 10-2
224	Jackson, A.L. ...	M. L. 1	15-0	66-8 3-6	131-0 16-5
323	Kaye, C.W.	Up. v	17-9	70-0 1-5	143-2 10-7
379	Lane, R.O.B.	M. iv	14-7	66-3 4-2	134-0 29-0

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.
64	Little, J.F.W. ...	vi	16-11	60-6 2-8	116-5 12-0
280	Mangles, A.E.R..	M. L. 1	15-10	64-9 3-2	131-6 17-8
160	Meyrick, L.O. ...	L. v 1	16-4	63-6 2-3	108-0 9-0
593	Molony, E.A. ...	vi	17-2	63-4 3-2	120-0 19-0
565	Penlington, E.T..	Up. v	17-5	65-3 3-5	117-5 14-5
69	Roberts, A.W. ...	L. v 2	15-6	69-0 2-1	146-0 8-0
251	Robins, H.H. ...	M. L. 1	15-9	63-0 3-1	122-0 -1-5
152	Ross, A.J.C.	M. M. 2	15-7	67-5 4-4	151-0 23-5
77	Sharp, A.J.	M. v	15-3	62-3 4-2	101-8 11-0
286	Sidgwick, C.T....	Up. iii	15-0	63-0 3-0	103-5 12-7
405	Waddilove, R.A.W.	M. L. 1	15-10	65-1 3-8	100-5 13-7
442	Williams, A.P.W.	M. M. 2	16-2	66-8 1-6	138-5 3-5
473	Worship, H.L. ...	M. L. 2	15-6	58-6 2-6	85-7 7-9
441	Wright, J.J.	M. M. 2	16-0	63-7 3-4	121-0 20-0

BOYS ENTERED JANUARY, 1881—1883.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
163	Annesley, A.D....	Low. v 1	16-5	67-2 6-0	124-0 30-5	29-0 1-4	21-1 0-4	13-4 1-7	8-5 1-0
99	Brown, S.R.	Up. v	15-8	66-2 5-7	127-2 25-7	31-0 3-3	22-1 0-6	13-6 1-9	8-7 1-2
14	Clark, S.H.	Up. v	15-8	60-3 4-5	98-5 19-0	27-8 2-1	21-8 1-3	12-4 1-4	8-0 1-0

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
468	Coats, W.H.	Mod. M. 1	17-1	63-8 5-3	112-7 31-2	27-2 1-2	20-9 0-7	12-3 1-8	9-2 1-7
470	Coats, P.M.	Mod. M. 1	17-0	83-3 4-8	110-0 27-0	28-0 2-3	21-3 0-6	12-2 1-5	9-5 2-0
483	Crookenden, G.P.	Up. iv (b)	14-11	62-7 4-2	107-5 16-0	28-2 0-7	22-2 0-5	12-2 1-0	8-1 0-6
245	Dean, J.E.	Up. iii	12-7	57-9 3-6	98-7 17-2	28-0 2-3	21-3 0-6	11-9 0-7	8-4 0-9
566	Dobbs, C.R.	Low. v 2	14-3	62-4 3-9	107-8 17-3	28-0 0-3	21-7 -	12-4 1-4	8-6 0-4
307	Drake, E.O.	Mid. iv (a)	15-6	63-3 3-8	118-5 12-5	29-2 0-5	22-5 0-5	13-1 0-4	9-0 0-5
232	Ferguson-Davie, A.F.	Mod. M. 1	15-8	65-1 3-9	109-8 16-5	28-0 0-5	21-3 0-6	12-0 1-0	8-0 0-8
300	Fisher, F.	Mod. M. 2	15-8	63-2 3-7	120-0 22-7	29-4 2-7	21-9 0-7	13-3 1-6	9-0 1-5
124	Giveen, R.F.	Mid. v	16-6	60-4 5-2	99-7 21-7	27-4 2-6	21-6 0-6	12-0 1-3	8-3 1-0
171	Green, C.G.	Mid. iv (a)	13-6	59-7 3-7	95-2 6-4	26-8 0-1	21-5 0-3	11-5 0-8	8-0 0-5
345	Guest, J.J.	Low. v 1	16-8	66-6 1-6	134-7 19-9	34-5 3-5	21-3 0-3	13-6 0-9	9-5 1-5
181	Harvey, E.M. ...	Mod. M. 1	15-8	65-9 6-4	129-0 33-5	30-5 3-8	22-2 0-7	14-2 1-7	8-3 0-8
333	Heaton, G.	Mid. iv (a)	14-10	64-0	108-0	27-5	21-3	11-6	7-7
329	King-Harman, W.A.	Mod. L. 2	14-2	59-3 3-8	92-3 12-3	29-4 3-4	21-0 0-7	11-8 1-6	7-7 0-7
487	Kingsbury, W.E.	Low. v 2	16-10	58-3 4-8	111-0 21-7	30-8 1-3	22-1 0-6	11-7	9-2 0-7
34	Latter, H.	vi	15-2	64-8 4-8	116-5 23-0	29-3 2-3	22-5 0-4	12-6 1-6	8-2 0-7
564	Lazenby, F.	Mod. L. 1	15-10	62-6 3-8	108-0 12-5	30-0 3-0	21-2 0-2	12-0 0-5	8-3 0-3
567	Mac Innes, W.R.	Mod. M. 1	15-9	62-7 4-2	110-9 23-9	27-8 2-0	21-6 0-6	12-6 1-1	8-6 1-0
505	Matthews, W.A.	Up. iv (a)	15-1	65-6 3-6	126-7 20-2	32-0 2-5	21-8 0-3	12-8 1-3	9-5 1-5
156	Meeres, E.W.M.	Low. v 1	15-5	61-6 3-3	107-3 21-1	29-5 2-5	21-8 0-3	12-3 0-8	8-5 1-1
126	Michell, R.T. ...	Up. Sh. (a)	15-1	66-2 4-2	118-5 20-2	29-4 0-6	21-3 0-1	12-5 0-3	9-4 1-7
492	Miller, G.A.	Up. iv (a)	15-3	66-0 6-5	121-5 23-0	29-1 3-1	22-2 1-2	12-0 1-3	8-8 1-1
410	Pennethorne, H.E.	Mod. U. 2	15-0	61-2 2-4	103-5 6-7	27-3 2-1	21-5 -	12-5 0-5	7-8 0-3
134	Poynton, F.J. ...	Up. Sh. (a)	13-9	60-8 5-8	101-0 23-2	27-8 1-1	21-6 0-6	12-0 1-5	8-6 1-4

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
210	Price, W.B.	Mod. L. 2	15-1	60-2 3-4	91-0 9-2	26-0 -	21-1 0-1	10-8 0-8	7-4 0-4
552	Rogers, A.E.	Mod. U. 1	15-11	61-6 5-4	117-0 28-0	29-6 3-8	21-3 0-4	13-7 2-9	9-1 1-1
439	Rolleston, G.L.	Rem. A	16-3	62-9 3-6	95-5 10-5	27-0 0-5	21-5 0-8	11-0 0-8	7-2 0-7
378	Rose, W.A.	Mod. M. 2	17-3	67-8 2-5	152-0 24-0	33-3 1-8	21-5 0-5	15-2 1-5	11-0 1-7
489	Stansfeld, H.H.G.	Mod. L. 1	13-1	57-6 3-6	90-4 13-1	27-0 1-3	21-3 0-6	11-5 1-0	8-0 1-0
242	Streetfeld, G.E.S.	Up. iv (b)	14-0	64-5 4-4	116-0 23-0	29-6 1-7	22-3 0-5	11-9 0-9	8-9 1-3
458	Tyssen, H.S.	Mod. M. 1	15-11	66-1 6-6	130-0 37-7	29-0 2-8	21-1 0-1	12-8 1-6	9-4 1-4
572	Vans-Agnew, E.L.	Up. Sh. (b)	15-4	64-3 4-0	104-5 14-0	28-8 1-1	21-6 0-4	12-5 1-3	8-0 1-0
186	Waller, E.H.	Mod. M. 2	17-0	68-6 3-8	150-7 20-7	35-6 4-1	23-1 0-9	13-0 1-0	10-0 1-0
169	Wanklyn, J.A. ...	Mod. L. 2	14-3	59-5 3-2	84-5 11-0	25-0 0-5	21-7 0-2	10-5 0-5	6-8 0-3
443	White, W.G.	Mid. v	16-2	63-9 5-9	113-3 29-0	29-0 3-0	21-7 0-7	12-2 1-7	8-4 1-2
510	Whittow, E.S. ...	Mod. U. 2	16-6	63-6 4-0	113-5 24-0	31-2 4-2	21-0 0-8	12-0 1-0	8-3 1-0
580	Winterbotham, H.B.	Mod. U. 3	16-0	69-2 4-2	150-5 33-2	34-5 3-5	22-7 0-7	13-5 1-3	10-0 1-3

BOYS ENTERED IN JANUARY, 1892-3.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.
504	Alger, H.	M. L. 2	14-10	59-0 1-7	97-5 7-0
43	Beakerville, G.K.	Up. Sh. (b)	15-7	61-1 2-4	103-3 7-8
199	Batty, C.N.B. ...	L. iv	14-0	62-2 2-2	97-2 6-2
425	Beynon, H.L. ...	M. U. 3	14-9	59-7 2-7	86-0 6-0

No.	Name.	Form.	Age Years.	Height. in. inc.	Weight. lbs. inc.
308	Boileau, K.	L. iii	13·6	60·3 2·0	90·0 7·2
257	Bolton, M.C.	M. L. 2	12·11	58·3 2·3	86·9 6·4
456	Bosworth-Smith, G.H. Up. Sh. (b)	14·11	58·3 4·0	87·2 14·4	
417	Bowring, H.I. ...	M. iv. (b)	13·2	55·5 2·0	87·0 5·0
250	Bryana, E.H.L. ...	M. iv. (b)	15·11	64·0 2·0	123·0 14·5
534	Bulman, H.G. ...	M. L. 2	14·7	66·2 4·2	121·7 22·2
10	Burnaby, R.B. ...	L. v 2	13·1	53·9 1·6	100·0 7·2
557	Burness, A.G. ...	M. iv (b)	14·3	59·3 2·0	96·0 8·5
78	Chambers, C.G. ...	M. iv (a)	12·8	59·6 1·6	90·5 2·5
280	Codrington, R.E. ...	L. iv	14·2	64·8 3·6	126·9 13·4
555	Coles, H.E.	Up. iii	14·9	61·5 1·9	94·0 5·0
375	Comber, H.G. ...	L. iv	13·4	60·5 2·1	95·5 4·7
166	Danvers, F.J. ...	M. L. 2	15·1	63·5 2·3	113·0 13·2
577	DeMontmorency, L.J.M. U. 2	16·3	66·0 4·0	121·5 17·0	
95	Ellis, F.N.	Up. Sh. (a)	15·9	69·4 0·7	153·5 10·0
94	Etheridge, L.S. ...	L. v 1	15·1	62·6 3·5	105·5 15·0
461	Evans, R.G.	Up. iv (b)	14·11	64·8 3·6	126·2 13·7
226	Everett, E.F. ...	M. U. 2	15·2	68·5 2·2	162·2 17·7
174	Fellden, R.R. ...	M. L. 1	15·11	64·8 2·8	125·0 18·5
206	Fletcher, C.E. ...	Rem. A.	14·6	62·5 2·5	117·2 11·4
20	Giveen, H.M. ...	Low. v. 2	13·11	56·8 1·8	82·7 8·7
364	Harvey, R.N. ...	Mod. U. 2.	15·0	57·6 1·7	91·5 7·0
322	Henley, C.B. ...	Low Sh.	14·1	60·7 2·2	99·8 7·0
266	Hickman, J.O. ...	Low. iv.	12·9	54·6 2·1	77·5 7·7

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.
573	Keeling, A.T. ...	Up. Sh. (b)	15·7	68·5 2·5	138·6 14·1
107	Kitto, W.W.M....	Low. iii	13·11	58·7 2·0	90·2 6·7
101	Kitto, H.	Up. iii	12·8	55·0 2·5	84·5 6·5
112	Maurice, W.B. ...	Mid iv (b)	14·11	62·1 2·0	99·5 9·5
231	Olivier, A.C.S....	Up. Sh. (a)	15·9	59·8 2·1	100·0 0·5
478	Padwick, E.D. ...	Mod. L. 1	14·4	62·2 3·2	108·0 9·5
232	Pochin, E.A.N....	Mod. U. 2	15·2	60·7 2·8	95·5 2·5
51	Preston, R.D.A....	Low. v. 1	15·8	64·4 4·4	111·0 20·5
180	Procter, A.H. ...	Low. iii	14·1	57·8 1·9	83·5 2·7
408	Rooke, H.P.W....	Low. Sh.	13·8	60·8 2·8	88·0 9·5
373	Simon, A.P.	Up. iv (a)	13·5	53·2 1·5	98·0 2·0
533	Smith, J.M.	Rem. A.	15·5	63·3 3·4	111·5 15·5
407	Smith, T.P.	Mod. M. 2	14·11	65·1 2·2	130·0 15·2
339	Smith, B.M....	Up. Sh. (a)	13·2	61·2 2·2	95·8 6·5
437	Swinhoe, E.	Low. iii	13·4	60·1 3·0	90·6 4·1
539	Thynne, A.G. ...	Up. iv (b)	16·1	65·9 3·1	119·0 11·5
127	Tindall, A.L.B....	Mid. iv. (b)	14·6	61·0 3·5	108·8 11·0
335	Waterfield, B.C....	Mod. L. 2	14·4	62·9 4·4	117·0 21·5
555	Whitow, T.	Low. iii	13·5	59·8 2·1	98·0 13·0
301	Wilkinson, C.J.E.	Up. iv (b)	14·9	57·7 2·4	98·2 9·2
431	Woolwright, H.V.	Mod. M. 2	15·2	64·5 1·9	116·0 9·7
353	Yeames, W.	Mod. L. 2	14·1	57·3 2·8	84·5 12·2

BOYS ENTERED JANUARY, 1883.

No.	Name.	Form.	Circumference of				Arm.	Place of Birth.
			Age.	Height.	Weight.	Chest.	Head.	
			Years.	in.	lbs.	in.	in.	
79	Abbott, R.C.....	Up. iv. (b)	13·7	63·4	102·0	28·0	22·0	Tottenham
142	Aglen, F.A.....	M. iv. (a)	13·5	58·6	98·5	27·0	21·0	Scarborough
73	Alexander, R.G....	L v 2	13·10	58·7	104·5	28·5	21·5	Stirling
530	Bell, W.J.....	M. L. 2	13·11	58·5	90·3	25·5	21·7	Sheffield
144	Bell, G.M.....	L. iii	10·10	55·7	76·8	25·0	21·0	London
217	Bishop, T.H.....	Mid. iv. (b)	14·8	63·9	110·0	29·3	21·5	Stonehouse
218	Bishop, H.H. ...	L. iv	13·5	58·1	95·2	26·5	20·6	Stroud, Gl.
380	Boger, R.W.....	Mod. L. 1.	14·8	63·6	108·5	29·2	21·3	Ryde
587	Booth, C.	L. iv	14·5	59·5	91·7	27·0	21·4	Liverpool
471	Bott, A.F.....	Up. iv. (a)	14·3	61·0	97·0	27·0	21·5	Derby
252	Byron, C.E.	M. M. 2	12·6	56·4	74·2	26·5	21·7	Coulston, Surrey
327	Child, G.A.	ii	12·3	55·3	77·0	24·4	21·3	Cirencester
220	Cooper, E.....	L. iv	12·11	57·0	74·2	24·0	20·4	Valpariso
576	DeMontmorency, W.J.H.M. M. I.	Up. Sh. (a)	15·0	63·8	110·5	29·0	20·7	Taunton
86	DeWinton, R.F.C.	Up. Sh. (a)	14·6	62·3	112·2	28·5	21·9	Boughrood, Radnor
267	Dobie, E.O.	L. iv.	14·3	56·2	73·0	26·5	21·3	Chester
497	Ewart, R.A.M....	M. L. 2	13·5	59·9	95·0	26·0	20·2	Burton-on-Trent
70	Fuller, W.A.....	ii	11·5	57·0	85·0	25·8	20·8	India
276	Grylls, W.E.J....	M. iv. (a)	14·8	63·8	113·5	28·5	20·5	Chindwarra, India
382	Guest, H.M.....	L. iv	15·1	64·6	117·2	30·1	21·2	Birmingham
554	Hall, A.C.....	M. M. 1	13·6	66·1	127·0	30·3	22·1	London
500	Holloway, P.M....	M. L. 2	15·1	64·2	117·5	29·5	21·2	West Brompton

No.	Name.	Form.	Age. Years.	Height. in.	Weight. lbs.	Circumference of				Place of Birth.
						Chest.	Head.	Leg.	Arm.	
						in.	in.	in.	in.	
84	Kindersley, W.L.	L. v 2	14.6	65.0	109.3	27.5	21.4	11.3	7.8	Bramford Speke, Devon
323	Lascelles, E.....	L. Sh.	12.10	61.0	94.0	26.4	21.0	11.5	7.4	Camberley, Surrey
433	Lloyd, W.F.....	L. iv	14.1	58.8	92.8	27.2	21.5	11.1	7.8	Southsea, Hants
427	Maurice, O.G. ...	Up. iii	13.3	60.5	87.0	26.0	20.7	11.0	7.2	Marlborough
446	Maurice, E.C. ...	ii	12.2	61.5	89.0	26.1	20.7	11.0	7.3	Marlborough
566	Mavrogordato, A.J.	M. iv (a)	14.2	60.3	96.0	27.3	21.1	11.8	7.6	Manchester
463	Miller, C.D.	M. iv (b)	14.5	57.7	89.5	25.7	21.2	11.0	7.6	London
368	Mohun-Harris, A.W.	Up. iii	14.0	56.3	82.6	25.3	21.2	10.8	7.1	Nr. Brecon
214	Nicholson, G.B...:	ii	11.6	54.6	70.0	25.0	20.5	10.2	6.8	Hull
397	Nockolds, A.G....	M. L. 2	14.2	62.2	103.3	27.5	21.3	12.0	8.0	Saffron Walden
374	Oldfield, F.D.P....	Up. Sh. (b)	13.8	59.4	87.8	29.0	20.7	10.3	7.5	Stamford
464	Owen, W.F.W....:	L. iii	13.0	59.9	98.0	27.0	20.5	13.0	8.3	Payewater, London
233	Robins, W.A. ...:	Up. iv (b)	14.6	61.5	101.0	29.2	21.6	11.9	7.8	Bishopstone, Hereford
551	Rogers, K.....:	M. L. 2	13.0	60.0	102.0	27.5	21.6	11.5	8.3	St. John's Wood
514	Smallwood, A.L...:	M. iv (a)	13.1	59.1	96.0	27.0	21.0	13.0	7.2	Castle Bromwich
243	Streetfield, C.A.C.	L. iii	12.7	62.5	124.2	31.5	21.7	13.5	9.7	Howick, Northumberland
492	Tinsley, H.:	Up. iii	14.0	58.5	98.0	26.7	20.7	10.2	8.5	Stockton, nr. Warrington
502	Towgood, A.L....:	M. L. 2	14.2	65.0	133.2	30.2	22.3	13.0	9.2	Little Paxton, Huntingdonshire
436	Ward, G.L.S.	Up. iii	13.11	56.7	71.5	24.8	20.0	9.3	6.5	India
383	Watson, L.A.	L. iv	14.7	64.5	113.5	30.6	22.0	12.0	8.2	Dorchester
475	Watson, C.H.	M. iv (b)	14.2	58.9	89.0	27.0	21.3	11.5	7.6	Plumblond, Carlisle
420	Watts, C.D.R.	L. Sh.	12.1	56.2	75.5	25.5	20.1	10.8	7.0	Muttra, India
98	Wilding, C.A. ...:	M. iv (b)	14.9	67.3	148.3	33.7	21.2	14.2	10.0	Arley, Bewdley
133	Willis, F.E.D'A...	M. iv (a)	13.8	61.7	87.8	27.0	20.5	10.8	7.0	Wendover, Bucks

BOY ENTERED MAY, 1876—1883.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
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31 Davies, M. Ll. ... vi. 18-7 68-5 1-0 141-0 3-8

BOY ENTERED MAY, 1877—1883.

459	Fox, G.	L. v	17-7	64-8	2-6	140-5	21-5	30-8	0-6	22-4	0-1	13-4	0-5	10-5	1-1
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BOYS ENTERED MAY, 1878, 1883.

137	Cholmeley, H.W.	Rem. A.	16-1	63-3	3-4	107-5	14-5								
201	Creeke, H.B. ...	vi.	18-4	67-6	0-5	131-5	1-5								
317	Leach, N.	L. v	16-1	65-5	3-0	114-8	9-8								
60	Streatfeild, H.C.	vi.	16-6	68-6	1-5	147-3	11-8								
423	Templer, F.N. ...	M. U. 1	17-9	66-9	0-3	146-5	8-0								

BOYS ENTERED MAY, 1879—1883.

274	Badcock, A.J. ...	Up. Sh. (a)	16-11	62-3	4-3	113-2	27-2	27-4	0-4	21-4	0-1	12-8	1-5	8-6	1-0
588	Brooking, A.H. ...	M. v	17-5	70-2	4-5	128-5	19-7	29-8	1-3	22-3	—	12-8	0-8	9-3	0-8
271	Browne, G.H.S. ...	Rem. A	16-9	70-7	4-1	150-2	25-9	32-0	2-8	22-1	-p	13-5	0-8	9-6	1-0
889	Cooper, G.E. ...	M. U. 2	16-9	66-2		127-2		28-7		22-1		12-8		8-3	
483	Few, R.E.	M. U. 1	17-9	65-7	4-7	118-2	24-2	29-7	3-7	21-6	0-8	13-8	1-8	8-5	0-9
294	Fox, H.O.	vi	17-8	69-0		151-0		32-1		22-9		14-0		10-0	
466	Gamon, J.P.	M. v	18-1	69-6	2-6	143-7	13-9	33-7	4-3	21-9	0-3	14-1	0-6	10-8	1-8

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
194	Gregory, C.A.O.T.	M. iv	16-0	62-2 5-0	116-5 32-2	28-9 8-6	21-0 0-5	12-5 1-5	9-0 1-5
331	Home, J.A.	L. v	16-10	63-7 5-7	113-3 28-8	30-8 3-8	21-5 0-4	12-6 1-6	9-1 1-4
491	Kruger, J.C.	M. M. 2	15-8	62-0	112-5	27-9	21-2	13-3	8-5
173	Nicholson, J. ...	Up. Sh.	16-5	70-0 5-4	136-0 33-5	28-9 2-4	22-4 0-5	12-7 1-2	9-0 1-4
262	Teesdale, E.J. ...	Up. Sh.	15-11	66-4 3-9	145-0 26-0	30-8 1-2	21-9 0-4	13-8 1-5	10-6 2-0

BOYS ENTERED MAY, 1880-1883.

561	Allen, P.E.	M. iv	16-11	66-1 1-6	115-3 10-3				
570	Batley, R.A.	M. M. 1	15-1	64-4 4-3	121-0 19-0				
415	Bett, T.C.	M. M. 1	14-9	65-0 2-8	128-0 11-0				
426	Brooke, R.G.	M. U. 1	16-7	66-4 2-8	127-0 21-5				
182	Burrows, P.	M. L. 2	14-9	60-3 2-8	112-5 14-8				
244	Casson, H.A.	Up. 5	15-11	66-8 2-3	129-0 12-0				
89	Clayton, F.	M. U. 1	16-0	67-2 2-8	126-5 21-5				
484	Colville, H.C.A. ...	M. M. 1	15-0	65-4 2-8	125-2 16-2				
395	Cooper, H.J.	Up. iv. (a)	15-5	64-1 3-0	123-0 23-0				
164	Elles, J.M.	M. U. 1	17-3	67-4 1-8	132-5 12-5				
48	Field, A.B.	Up. Sh. (a)	15-3	60-5 1-8	91-5 3-3				
540	Forbes, J.O.	L. v	16-3	68-5 1-8	135-5 8-0				
550	Hill, H.B.	M. M. 1	16-2	69-8 1-8	142-0 12-0				
261	Hill, R.B.	L. iv	14-11	64-1 3-3	116-7 11-2				
559	Jenner, L.L.C.A.	L. v	17-5	66-0 1-1	134-5 2-8				
412	Langworthy, R.	M. iv	14-5	58-1 1-5	85-7 4-2				
455	Lowndes, H.M. ...	M. U. 1	16-5	62-1 1-4	102-2 4-2				

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	
82	Paine, W.H.C. ...	Up. iii	14.5	55.0 3.0	83.7 15.2	2 years' increase.
309	Percival, A.P. ...	Up. iv. (b)	15.0	56.8 1.4	79.0 3.0	
477	Petrie, C.L.B. ...	M. U. 1	16.4	64.2 1.4	127.0 12.0	
87	Rotherham, W. H.	M. U. 1	17.2	78.0 -	169.5 1.5	
55	Thomson, H.V....	M. L. 1	15.1	61.4 3.4	111.5 13.5	2 years' increase.
168	Walker, L.S.....	L. iv	13.10	57.1 1.6	80.2 4.2	
161.	White, B.F.	Up. iv. (a)	16.0	58.0 -0.9	87.2 4.2	
15	Williams, W.S....	M. U. 1	16.11	64.3 0.3	126.5 3.5	

BOYS ENTERED MAY, 1881-1883.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
113	Adams, J.H.	L. iii	13.0	56.7 3.0	88.7 13.7	26.8 0.8	21.5 1.5	11.5 1.0	7.9 0.9
279	Alexandroff, J....	M. M. 1	16.1	65.6 5.1	118.8 21.8	28.2 0.7	20.9 0.4	12.5 1.0	8.4 1.0
71	Allen, A.G.	Rem. A.	15.10	68.7 3.0	146.0 27.0	30.8 3.3	21.5 0.5	14.3 1.2	9.2 1.2
178	Boldero, W.	M. iv	13.10	56.6 3.3	85.5 13.0	24.2 0.5	21.1 0.4	11.0 0.5	8.0 1.1
520	Cairnes, F.H. ...	M. M. 2	15.5	63.2 4.7	110.0 22.5	27.1 1.1	21.9 0.2	12.2 1.2	9.0 1.5
513	Cooke, W.G.	Rem. B.	16.10	66.2 2.2	129.0 9.2	30.4 1.4	21.4 0.4	13.4 0.9	9.0 1.0
167	Cowley-Brown, G.C.L. iii		14.1	57.3 3.5	81.8 14.8	25.6 1.1	20.7 0.5	10.2 0.6	7.0 0.8
158	Darrell-Brown, H.F. Rem. A.		15.11	63.7 2.9	100.0 15.0	28.4 0.7	21.1 0.6	12.0 1.5	8.0 1.3
122	Ford, F.C.	Up. iv (a)	15.7	66.3 2.8	134.0 18.0	28.6 0.8	21.5 0.6	12.6 0.9	10.2 1.5
286	Gordon, F.	Rem. B.	16.4	60.2 3.7	98.5 23.0	26.4 2.1	20.6 0.3	11.4 1.2	8.7 1.6
21	Hayhurst, H.F... M. v		16.5	62.5 3.5	110.5 21.0	27.9 0.9	22.4 1.6	11.5 0.9	8.5 1.5

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
501	Hilleary, L.M. ...	Rem. B.	15-8	66-4 3-7	127-7 27-7	29-7 3-7	20-9 0-3	12-5 1-8	8-5 1-2
41	Hills, H.G.	Rem. B.	16-4	68-2 5-1	131-7 7-2	30-6 2-4	21-9 0-5	12-7 1-4	8-9 1-5
85	Lambert, C.H. ...	M. M. 1	14-11	59-1 3-1	90-7 12-4	26-9 2-4	21-7 0-5	10-5 0-2	8-1 0-6
135	Lascelles, W.C. ...	M. M. 2	15-10	67-1 3-7	122-0 22-2	27-7 0-2	21-5 0-4	12-5 0-8	8-9 0-9
136	Lascelles, R.F. ...	M. M. 2	14-5	66-4 4-7	111-8 26-0	26-5 2-0	21-4 0-7	12-0 1-3	8-0 1-2
575	Lewis, G.	M. L. 1	14-0	62-8 3-8	100-0 13-7	26-4 0-9	21-5 1-0	11-9 0-9	7-9 0-7
472	Linnell, A. J. ...	Rem. A.	16-7	68-2 4-3	127-7 27-4	29-8 2-8	22-2 0-7	12-4 0-9	9-1 1-6
429	Logan, N.W.	M. L. 1	15-4	61-5 5-0	103-8 23-5	26-9 0-6	21-4 0-4	12-0 1-7	8-5 1-6
291	Martyn, A.	Up. iv (a)	14-5	66-3 5-7	124-5 27-5	28-7 1-9	22-0 0-2	12-0 0-8	8-8 1-0
568	Merry, W.J.C. ...	L. v	15-11	66-8 4-4	136-0 20-7	34-2 3-5	21-9 0-3	13-4 2-1	9-2 1-2
83	Pemberton, E. ...	M. M. 2	14-10	59-3 1-8	89-2 10-4	28-3 1-5	20-5 0-5	10-5 0-5	7-5 0-9
340	Robertson, W. H.	Up. Sh. (a)	14-8	65-8 4-7	130-0 27-0	28-9 0-4	21-7 0-2	13-4 1-6	9-0 1-4
311	Verity, E.G.	L. iii	14-0	56-9 6-6	83-0 10-2	25-9 2-2	20-7 0-1	11-1 0-9	8-0 1-0
491	Willis, H.H.	Up. Sh. (b)	16-4	66-3 4-6	136-5 32-5	30-3 1-3	21-9 0-4	13-4 0-9	9-5 1-5
483	Woodhouse, A. L.	M. U. 2	16-10	64-5 5-0	113-7 27-9	27-9 2-9	21-3 0-7	12-5 1-8	8-7 1-7
205	Yeatman, F.P.S.	Up. Sh. (b)	13-6	59-5 3-1	83-2 11-7	26-4 0-7	20-9 0-5	11-6 1-4	7-0 0-3

BOYS ENTERED MAY, 1882-1883.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.
493	Ascherson, E.M.	Up. Sh. (a)	15-7	57-5 2-2	90-7 8-2
355	Badcock, G.H. ...	L. iii	11-10	56-3 1-3	81-0 4-5
448	Braithwaite, W.G.	L. iii	12-6	58-7 1-2	95-0 -0-7
253	Browning, F.H.	Up. Sh. (a)	14-10	58-3 1-3	102-0 8-0

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.
386	Clerke, St.J.G.S.	M. M. 2.	13-11	61-4 2-2	110-7 12-7
548	Coape-Smith, H.	M. U. 2.	14-7	59-1 1-8	91-0 7-5
398	Dawson-Thomas, E.M.	Up. iii	13-11	61-4 2-2	100-0 8-8
204	Drew, H.R.	M. iv.	14-0	58-8 1-4	85-2 6-5
408	Ellison, G.P.	M. M. 1.	14-5	63-7 1-3	109-0 2-5
191	Franks, G. McK.	Up. iv. (b)	14-6	64-5 3-3	110-2 18-2
47	Gray, C.H.	Up. Sh. (b)	14-1	56-5 1-5	85-2 -6-8
543	Harington, A.H.	M. L. 2	14-10	64-9 2-3	113-5 13-8
544	Harington, H.A.	M. iv	14-2	60-5 1-7	86-8 8-6
100	Hildebrand, G.L.	M. M. 2	14-9	67-8 1-4	139-0 7-0
449	Hussey, H.D. ...	Up. iv (b)	15-11	62-5 3-0	112-0 19-8
369	Krüger, A.E. ...	L. iii	13-6	57-5 1-5	89-0 3-8
352	Leveson, H.G.A.	M. iv	13-8	62-1 1-9	106-7 13-5
207	Mackworth, D. ...	M. M. 1	14-11	59-2 2-1	91-5 10-0
227	Macpherson, R.G.	M. M. 1	13-11	62-4 3-7	101-0. 16-3
536	Monckton, G.E.	M. L. 2	14-5	62-3 1-3	94-2 6-7
173	Nicholson, H. ...	Up. Sh. (a)	15-1	54-7 1-0	74-5 4-8
12	Ommanney, F.F.	Up. iv. (b)	14-7	62-3 1-9	96-5 7-0
163	Petley, H.	L. Sh.	12-8	56-4 1-1	75-5 6-8
179	Plumpton, C.B. ...	M. L. 1	15-3	63-4 1-6	125-3 20-1
499	Porter, W.N. ...	Up. Sh. (a)	15-3	58-7 1-1	84-5 8-5
365	Prowse, C.B. ...	M. L. 2	13-10	58-5 1-3	85-7 5-7
111	Robinson, A.S. ...	Up. iv (b)	14-1	59-1 1-8	88-5 7-3
388	Rowell, W.I. ...	Up. iii	13-10	60-6 1-8	103-0 6-3

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.
109	Rutherford, D.O.	L. iv	14.4	55.0	83.5
80	Sale, W.W.	Up. iv (a)	14.8	61.2 1.7	97.5 10.0
33	Simpkinson, E.V.	Up. iv (a)	14.0	53.6 1.1	73.7 -
24	Simson, J.M.	L. iii	12.3	56.5 1.5	80.2 4.5
509	Smallwood, J.E.	M. iv	14.5	59.6 2.1	92.5 0.8
246	Tate, J.C.	M. iv	13.7	61.4 1.7	111.5 10.5
203	Usher, P.J.	M. U. 2	14.8	62.4 1.9	106.2 8.2
454	Winder, W.B.	Up. iv (b)	14.2	53.9 1.4	77.0 4.5
97	Wyatt-Smith, H.	M. iv. (a)	13.8	60.1	104.2

BOYS ENTERED MAY, 1883.

No.	Name.	Form.	Age. Years.	Height. in.	Weight. lbs.	Circumference of			Place of Birth.
						Chest.	Head.	Leg.	
						in.	in.	in.	
200	Bent, F.L.	L. Sh.	12.2	57.3	80.0	23.2	20.9	11.4	7.5 Shrewsbury
506	Bliss, J.A.	Up. iii	13.2	60.7	93.0	25.7	21.4	11.0	7.5 India
578	Boulton, F.J.	M. L. 1	14.8	60.8	106.7	26.4	21.3	12.4	8.5 Stourbridge
492	Brathwaite, G.	L. Sh.	10.10	56.6	78.8	23.9	21.4	11.2	7.2 Hyming Wintthorpe
74	Burnaby, E.B.	L. iii	11.2	52.1	66.7	22.6	20.5	10.5	7.0 Wapping
431	Cheke, E.G.	M. U. 2	14.10	59.7	85.0	27.6	19.7	10.0	7.3 India
358	Cleghorn, C.A.	M. L. 2	13.2	55.0	70.2	22.6	20.6	8.9	6.8 Roxburghshire
39	Collins, L.G.A.	L. iii	11.10	56.7	80.0	24.9	20.6	11.5	7.2 Reading
304	Cunningham, B.A.	L. Sh.	11.9	56.2	81.2	23.5	20.9	11.0	7.3 Australia

No.	Name.	Form.	Age. Years.	Height. in.	Weight. lbs.	Circumference of			Arm. in.	Place of Birth.
						Chest.	Head.	Leg.		
						in.	in.	in.		
32	Davies, T.Ll. ...	Up. Sh. (a)	13·4	54·2	71·0	24·9	21·7	9·7	7·0	London
553	Dixon, J.E.	M. L. 2	14·10	60·5	101·5	26·9	21·8	11·0	8·4	Birmingham
230	Dowling, H.C. ...	Up. iii	13·5	54·9	79·0	25·3	21·3	10·8	7·5	Timperley
196	Drake, C.H.	M. iv	12·9	58·2	87·3	24·7	21·4	11·3	8·0	Brixton
37	Ellershaw, W. ...	L. iii	11·9	55·0	84·2	25·9	21·0	11·0	8·2	Chew Stoke
357	Ferguson-Davie, C.J. L. iii		11·1	55·3	80·0	24·1	20·5	10·6	7·7	Yelverton
413	Few, M.H.	M. iv	13·9	58·9	89·5	25·7	21·9	11·2	7·0	Esher
228	Field, H.		12·5	60·5	88·5	25·7	21·3	10·5	7·3	Clapham
150	Fletcher, H.M.	Up. Sh. (b)	12·8	55·4	74·7	22·9	20·7	10·1	7·5	Paddington
128	Hammick, S.F.	Up. iii	12·3	55·2	77·0	25·1	20·8	10·8	7·3	Aldershot
310	Kaye, L.M.	L. iv	14·2	60·4	92·2	25·4	20·2	11·0	7·6	Potter's Bar
486	Macdonald, A.H.	M. iv	12·6	56·5	82·0	25·6	21·1	11·0	7·2	Marlborough
337	Mead, G.A.	M. L. 2	14·1	64·6	120·2	28·7	21·7	13·0	8·9	Notting Hill
235	Michell, R.F. ...	M. L. 1	14·10	61·4	103·5	27·9	21·4	12·0	8·0	Weymouth
195	Molony, T.C.W. ...	M. L. 1	14·9	61·3	109·5	27·4	21·9	12·5	8·8	London
193	Owen, C.H.W. ...	L. Sh.	10·6	54·1	72·7	22·9	20·4	10·0	7·3	Bayswater
190	Pern, E.C.	L. iii	12·1	56·3	79·5	24·5	21·0	10·8	7·0	Botley
293	Pridham, G.R. ...	L. Sh.	10·7	51·6	66·0	22·9	21·5	9·8	7·3	Chorlton-cum-Hardy
344	Radclyffe, C.P.F.	L. iii	12·6	60·0	96·7	26·9	21·5	11·4	8·2	Cannock
256	Rampini, F.C. ...	L. iv	14·10	59·2	91·8	24·9	20·2	11·5	7·8	Jamaica
440	Bigby, G.C.	L. iv	14·7	60·0	92·2	25·9	21·3	10·7	7·9	Torquay
421	Rivington, G.S. ...	L. Sh.	12·5	55·8	76·0	23·9	19·9	10·7	7·2	London
177	Rose, E.D.	L. Sh.	11·11	53·8	75·2	23·9	20·9	10·7	7·0	Stepney

No.	Name.	Form.	Age.	Circumference of				Place of Birth.
				Height.	Weight.	Chest.	Head.	
			Years.	in.	lbs.	in.	in.	
343	Savile, L.H.	L. Sh.	12-8	57-7	78-2	23-5	19-9	Broad Clyst
508	Smith, P.S.	M. L. 2	13-10	60-0	86-0	23-9	21-2	Birmingham
303	Stayner, L.G. ...	Up. iv (a)	13-9	57-5	83-7	25-9	20-9	Overbury
569	Wilson, A.B.B....	L. iv	14-6	62-2	99-5	28-4	20-6	Australia
134	Woodham, W.R.	L. iii	11-11	54-4	70-5	24-1	20-4	Romsey
210	Wrighton	M. iv	14-0	62-9	104-7	27-3	20-7	Paddington

BOYS WEIGHED OCTOBER, 1876, 1878, 1880, 1881, 1882, 1883.

No.	Name.	Form.	Age.	Height.		Weight.	
				in.	inc.	lbs.	inc.
			Years.				
255	Curtis, A.	vi	17-11	67-6	4-2	113-0	13-0
306	Martineau, L. ...	M. U. 1	17-6	70-2	2-1	162-5	32-5
411	White, E.D.	M. U. 1	18-2	66-9	1-4	130-0	5-5

BOYS WEIGHED OCTOBER, 1877, 1879, 1881, 1882, 1883.

No.	Name.	Form.	Age.	Height.		Weight.		Chest.		Head.		Leg.		Arm.	
				in.	inc.	lbs.	inc.	in.	inc.	in.	inc.	in.	inc.	in.	inc.
			Years.												
249	Bryana, A.H. ...	L. v	18-3	70-4	0-7	150-0	5-0	34-0	0-3	22-4	0-1	13-3	0-7	9-9	0-5
115	Firth, E.C.O. ...	vi.	17-0	66-9	1-6	132-5	8-5	30-5	1-0	22-5	0-5	12-4	0-1	9-3	0-6
18	Roberts, C.H. ...	vi.	18-1	73-3	1-8	159-0	16-5	31-2	2-8	22-2	0-5	14-0	—	9-5	0-8

BOYS WEIGHED OCTOBER, 1878, 1880, 1881, 1882, 1883.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	
240	Bliss, C.E.	M. U. 1	16-9	66-6 1-9	120-7 15-7	
139	Chappel, H.R. ...	vi	16-5	67-7 2-0	143-0 17-5	
447	Cooper, C.E.	Up. Sh. (b)	16-2	63-2 4-2	112-0 18-5	2 years' increase.
444	Cooper, H.R. ...	L. v	15-7	70-2 4-7	133-2 29-2	2 years' increase.
319	Dowding, H.A.	M. v	18-3	67-0 1-4	133-0 6-5	
474	Ferguson-Davie, H.A. vi		18-1	69-8 0-6	157-2 10-2	
416	Manton, H.R. ...	M. U. 1	17-3	66-4 3-0	133-0 13-5	
59	Martin, D.E.	Up. v	17-1	65-6 0-6	141-2 2-7	
467	Padwick, F.G. ...	vi	18-1	70-0 0-5	188-0 25-8	2 years' increase.
129	Rew, C.E.D.O.	Up. Sh. (b)	16-11	67-6 5-1	137-5 24-7	2 years' increase.
285	Sharp, W.H.	vi	18-3	67-0 1-5	125-0 9-8	2 years' increase.
108	Stootherd, L.H.K.	M. U. 1	17-11	68-0 2-8	137-2 15-7	
149	Woolner, H.	M. v	17-0	72-5 0-8	177-0 11-5	

BOYS WEIGHED OCTOBER, 1879, 1881, 1882, 1883.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
488	Archer, D.O.	M. U. 1	17-3	67-1 2-6	140-2 14-2	31-0 1-0	21-9 0-5	13-7 1-2	10-5 1-3
333	Bell, H.L.	M. v.	16-5	62-8 7-8	107-0 34-0	28-9 4-9	21-5 0-3	12-8 2-1	8-0 1-0*
406	Bent, P.S.	Up. Sh. (a)	16-8	67-5 4-5	131-5 25-0	30-4 2-7	22-2 0-4	14-0 1-6	9-0 1-0
419	Bere, M.A.	Rem. b.	16-11	71-0 2-0	141-7 9-7	31-5 —	22-0 —	13-0 0-9	9-1 0-4

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
145	Bucknall, H.C. ...	M. U. 2	17-0	66-0 5-3	180-7 25-2	34-1 3-9	21-8 0-5	13-6 1-0	9-6 0-8
146	Bucknall, P.E. ...	M. M. 1	16-1	64-8 5-6	125-2 28-2	32-0 3-2	22-0 0-3	12-4 0-7	9-9 1-8
589	Bull, F.E.	vi.	17-1	68-7 1-4	157-2 17-2	32-0 0-5	23-2 0-4	14-2 1-2	10-5 0-9
239	Fairbairn, A.M.	M. M. 2	16-10	69-8 4-8	186-2 33-0	31-5 4-0	22-2 0-5	12-5 1-6	9-7 2-2
4	Lias, C.R.	vi.	17-7	64-3 4-9	135-0 24-0	29-0 1-3	22-1 0-3	13-0 0-7	9-7 1-4
590	Maurice, R.B. ...	L. v	15-3	67-8 9-5	130-7 42-2	29-9 3-9	22-7 0-5	12-8 1-8	8-6 0-9*
140	Nicholson, C.L.	M. U. 1	17-10	64-8 2-3	131-0 18-5	33-5 3-5	21-9 0-4	12-4 0-8	9-7 1-3
187	Ogbourne, L.C.W	Up. iv (b)	16-9	67-4 5-6	132-0 35-7	31-3 4-3	23-2 2-2	12-8 1-8	9-3 1-6
44	Powles, F.J.E. ...	Up. Sh. (b)	16-7	65-3 5-0	137-0 24-0	31-4 1-1	22-4 0-7	14-3 1-3	10-4 1-6
299	Preston, C.S.	vi.	18-5	71-4 0-6	162-0 12-0	34-2 0-7	22-7 0-3	15-2 0-7	10-5 1-1
90	Rawlinson, C.B.	vi.	17-5	67-3 3-9	149-5 25-5	31-4 2-6	22-5 0-7	14-0 1-0	10-6 1-1
414	Richards, H.B. ...	M. L. 1	15-7	61-4 4-8	112-0 24-0	28-0 2-5	21-2 0-4	13-0 1-0	8-8 0-8
106	Robertson, H.R.	abs.							
438	Robertson, E. ...	Up. v.	16-8	70-0 1-9	162-0 13-0	34-0 0-5	22-7 0-4	14-7 0-6	10-4 0-9
7	Sale, T.R.	vi.	18-6	68-9 2-3	146-5 14-5	31-0 0-4	21-9 0-4	14-0 0-9	9-6 1-1
541	Sharpe, H.C. ...	vi.	18-3	72-1 0-2	159-5 8-0	32-3 0-8	22-0 0-5	13-9 0-2	9-5 0-1
485	Soden, A.S.	M. U. 1	18-1	65-8 5-6	137-0 26-7	30-5 2-2	20-6 0-4	12-8 1-3	9-2 0-9
318	Trethewy, T.L. ...	Rem. a.	16-4	67-1 5-4	137-0 33-5	32-0 3-3	21-2 0-2	13-2 1-2	9-9 1-5
334	Usher, B.G.	vi.	16-7	62-4 4-7	110-7 17-7	29-0 1-5	22-5 0-2	11-8 -0-1	8-5 0-8
130	White, A.M.	M. v.	16-2	65-3 10-3	134-5 55-5	30-5 4-3	23-0 0-8	13-7 2-0	9-9 1-9*

* Four years' increase.

BOYS WEIGHED OCTOBER, 1880, 1881, 1882, 1883.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	
386	Alston, J.E.	M. U. 2	17-2	66-9 1-6	130-0 4-5	
321	Back, G.S.	vi	17-9	67-9 4-9	136-0 34-5	2 years' increase.
525	Belk, C.	M. U. 2	16-11	60-3 1-8	105-0 5-5	
590	Beynon, W.G.L.	M. U. 2	16-10	65-2 5-0	121-0 26-5	2 years' increase.
476	Briscoe, R.R. ...	M. M. 1	15-9	63-7 4-7	115-2 25-7	2 years' increase.
528	Cairnes, H.M. ...	M. M. 2	15-7	69-7 1-7	130-2 3-4	
549	Chaine, J.	L. v	16-9	67-3 0-8	138-8 10-8	
596	Clowes, W.A. ...	M. U. 2	16-9	61-9 1-9	100-5 8-5	
600	Curtis, G.S.	vi	16-3	67-3 2-9	121-0 10-2	
67	Daunt, A.	Up. Sh. (b)	16-8	68-7 —	146-0 11-5	
114	De Jersey, B.H.	Up. Sh. (a)	15-5	66-0 2-7	109-7 12-4	
38	Dundas, R.N. ...	M. v	16-8	68-1 0-6	153-5 7-5	
370	Freeland, L.G....	M. M. 2	16-5	62-7 5-6	104-2 24-2	2 years' increase.
371	Freeland, A.D....	M. M. 1	15-5	55-7 3-2	77-5 11-3	2 years' increase.
434	George, E.S.	M. U. 2	15-10	64-9 2-6	134-0 14-7	2 years' increase.
409	Griffith, T.F.	Rem. (b)	16-3	67-3 4-2	137-0 23-5	2 years' increase.
297	Hamerton, L.C.	Rem. (a)	16-7	67-5 1-0	131-2 0-7	
599	Herbert, E.C. ...	M. U. 1	18-1	63-3 1-3	125-7 8-0	
42	Jackson, A.B. ...	Rem (b)	15-6	59-7 3-2	86-7 12-7	2 years' increase.
377	Kekewich, H.H.	M. M. 1	16-11	64-3 0-1	126-2 2-9	
451	Macanlay, P.J.F.	M. U. 1	16-9	70-8 3-3	146-0 21-5	
314	Macpherson, A.H.	Rem. (b)	16-9	63-2 5-5	102-5 22-5	2 years' increase.
384	Mahaffy, A.W. ...	Up. Sh. (b)	14-11	62-8 4-1	109-5 18-0	2 years' increase.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	
120	Marah, N.N.	Up. Sh. (a)	15-8	63-8 2-0	136-0 14-3	
598	Mavrogordato, S.J.	M. U. 1	17-4	64-4 0-6	125-2 3-5	
208	Meyrick-Jones, F.	Rem. (b)	16-8	66-8 5-8	127-0 22-3	2 years' increase.
335	Molony, J.R.H.	Up. Sh. (a)	16-5	64-8 6-0	118-5 31-2	2 years' increase.
585	Nicholson, R.E.	M. U. 2	16-4	67-7 1-8	124-7 5-7	
16	Olivier, H.E.	Up. v.	17-7	63-1 1-2	115-0 2-5	
556	O'Neill, E.A.	Rem. (b)	16-11	68-9 1-1	157-3 9-8	
595	Ord, R.W.	M. U. 2	16-0	64-3 3-9	120-7 20-7	2 years' increase.
431	Palmer, C.S.	M. L. 1	14-9	59-3 2-9	91-2 5-7	
403	Phillips, P.C. ...	M. L. 1	15-1	57-3 4-3	92-0 21-0	2 years' increase.
298	Preston, H.S. ...	Up. v.	17-1	71-0 1-1	160-5 9-5	
349	Roberta, R.C. ...	Rem. (b)	17-0	65-7 2-7	127-0 10-5	2 years' increase.
119	Robinson, J.	L. v.	17-10	66-3 0-3	144-2 6-7	
537	Sheppard, E.B.	M. v.	17-4	62-2 2-5	117-2 8-9	
231	Stanton, H.L. ...	M. U. 1	15-10	66-3 2-3	148-0 21-5	
105	Streatfeild, G.H.M.	Rem. (a)	15-10	63-2 5-9	120-5 28-5	2 years' increase.
36	Weatherhead, A.S. vl		17-5	62-4 5-4	106-2 20-0	2 years' increase.
503	Webb-Ware, F.C.	Up. Sh. (a)	16-10	79-5 2-5	173-5 22-0	2 years' increase.
202	Wood, E.B.	M. U. 1	15-7	69-8 1-8	130-0 17-5	
562	Wright, J.C.	Rem. (a)	16-11	64-2 1-0	116-8 4-8	
27	Willson, A.B.W.	M. v.	16-5	64-7 4-7	136-7 32-7	2 years' increase.
423	Young, G.J.	Up. v.	17-7	68-9 1-1	151-7 18-7	

BOYS WEIGHED IN 1881, 1882, 1883.

No.	Name.	Form.	Age. Years.	Height.		Weight.		Chest.		Head.		Leg.		Arm.	
				in.	inc.	lbs.	inc.	in.	inc.	in.	inc.	in.	inc.	in.	inc.
104	Ashfield, C.E.	Rem. (a)	16-8	68-0	5-0	139-5	25-5	33-1	3-1	22-3	0-9	12-8	0-8	9-8	0-8
363	Atkinson, G.A....	Up. v.	16-8	67-3	6-1	131-5	30-0	28-7	2-5	21-8	0-6	13-3	1-0	9-2	1-5
324	Bainbridge, E.G.T. M. M. 1		15-10	63-4	3-4	116-0	30-5	30-0	2-6	21-8	0-3	13-1	1-6	9-0	1-5
268	Barlow, M.H.P.	M. L. 1	14-8	62-0	3-0	87-5	6-5	27-5	1-0	20-6	0-4	10-4	0-1	7-6	0-6
547	Barnicot, R.A. ...	M. U. 1	15-2	61-1	2-7	95-0	10-0	28-0	2-5	21-4	0-4	12-0	1-0	8-0	0-7
234	Benson, E.F. ...	M. v.	16-2	65-1	5-8	126-5	26-0	30-5	3-5	22-4	0-7	12-5	0-5	9-5	1-4
295	Berwick, A.S. ...	Rem. (b)	16-9	66-1	5-3	119-5	20-2	30-0	3-0	21-1	0-6	12-3	0-8	8-5	1-0
584	Blasson, S.G. ...	Up. Sh.	16-4	62-5	5-2	102-2	21-7	27-6	1-9	21-5	0-2	11-9	1-4	8-1	0-8
457	Broadbent, C.H.	Rem. (a)	16-4	68-0	5-1	136-8	21-5	32-5	2-8	22-1	0-5	12-9	0-7	9-0	0-8
418	Brown, W.F. ...	abs.													
29	Bryant, A.	M. M. 2	14-5	60-2	2-8	96-7	9-2	26-4	0-1	21-2	0-6	11-3	0-9	8-0	0-5
452	Cadell, A.	M. U. 1	16-8	67-2	1-6	141-0	9-0	34-5	4-5	21-6	0-3	12-4	—	10-9	1-6
359	Campbell, R.G.	M. U. 2	16-4	64-2	4-3	106-0	17-0	28-3	1-0	21-5	—	12-8	1-3	8-2	0-8
450	Carruthers, J.B.	Up. Sh. (b)	16-10	68-0	6-0	118-0	27-0	29-0	3-0	21-2	0-6	12-5	0-8	8-0	1-0
188	Chappell, G.P.	Rem. (b)	14-10	66-4	4-2	118-0	23-2	32-0	8-0	21-7	0-7	13-5	1-5	9-6	1-3
147	Colvile, C.R.	L. iv.	13-2	61-1	3-3	94-5	13-0	26-5	0-8	21-4	0-7	11-5	1-1	7-9	0-9
30	Davies, C.L.	Up. v.	15-2	61-3	4-5	106-0	15-0	28-7	1-8	21-7	0-6	12-0	0-5	8-7	1-0
522	Durlacher, N.J.	L. iv.	12-10	58-6	4-1	97-2	14-2	27-8	1-0	21-6	0-6	11-8	1-0	8-0	0-8
225	Eden, W.A.	Up. Sh. (a)	15-5	60-7	3-7	98-0	14-5	27-3	1-2	21-2	0-2	12-6	1-1	7-9	0-8
52	Ferguson-Davie, F.A. vi.		16-2	65-3	5-8	129-5	32-3	30-5	3-0	22-2	1-1	12-9	1-3	8-5	1-2
332	Finch, E.G.	M. iv.	14-3	60-9	3-8	94-0	17-0	26-1	1-1	21-2	0-7	11-0	0-9	7-4	0-8
338	Finch, H.K.	Up. Sh. (a)	13-2	55-7	3-7	80-2	11-7	24-3	0-3	21-4	0-8	10-5	0-6	7-1	0-7
521	Francis, L.A. ...	Up. v.	16-8	62-0	5-5	106-2	21-2	28-2	2-0	20-6	0-6	12-5	1-5	8-8	1-3

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
265	Grunmitt, H.J.	M. L. 1	14-7	61-4 2-9	109-5 11-7	29-2 -0-4	21-7 1-2	13-3 0-8	8-6 0-6
45	Haweis, L.T.J.	abs.							
157	Hay, J.A.	M. L. 1	14-11	64-3 3-9	109-8 15-0	27-3 1-0	21-2 0-4	12-7 1-2	8-4 0-6
376	Houghton, J.M.	abs.							
8	Houseman, H.deL.	L. iv.	14-4	64-0 5-9	116-5 27-0	28-3 2-6	21-3 0-7	12-3 1-3	8-6 1-1
400	Hulbert, J.G. ...	L. v.	16-0	64-7 4-8	118-2 15-7	30-0 3-0	22-4 0-4	12-9 0-1	8-5 0-6
212	Hume, R.O.C. ...	M. U. 1	16-6	66-1 3-9	140-5 21-2	32-2 3-5	22-4 0-9	13-7 0-7	9-5 1-3
360	James, J.E.	Up. iv. (a)	13-9	61-2 4-2	104-0 14-5	27-0 1-5	22-0 0-5	12-2 0-6	8-7 0-9
143	Kaye, E.P.	Rem. (b)	15-8	70-3 5-3	147-3 37-8	32-5 4-4	21-5 0-3	13-4 1-4	9-7 1-6
538	Landon, E.E.B.	M. M. 2	16-3	68-1 5-2	156-5 44-5	30-8 3-8	21-9 1-0	13-9 1-3	10-0 1-7
518	Lewis, H.M.	vi.	16-2	67-6 4-0	136-0 19-5	31-8 1-3	22-0 0-5	13-0 0-9	10-3 1-4
531	Martineau, G. ...	Rem. (b)	16-1	66-2 4-0	123-7 23-7	29-6 0-8	21-4 0-3	12-6 1-5	8-8 0-9
402	Maxse, R.E.H. ...	Up. iv. (b)	13-11	62-1 4-2	99-0 13-0	26-7 -1-0	21-1 0-4	11-6 0-6	7-9 0-6
141	Murton, C.L. ...	L. v.	16-2	64-9 5-9	130-2 30-2	28-5 1-7	21-5 0-5	13-9 1-3	8-8 0-8
277	Papillon, G.K. ...	Up. Sh. (b)	16-0	66-1 5-1	130-0 24-0	29-8 3-3	21-7 0-6	13-6 1-1	9-2 1-0
170	Preston, A.S. ...	Up. v.	15-9	68-0 4-3	130-0 25-5	31-5 4-0	22-1 0-4	12-1 0-7	9-0 1-2
243	Procter, E.L. ...	Rem. (b)	17-0	57-5 3-6	90-0 10-0	26-6 1-6	21-5 0-6	11-2 0-9	7-8 0-4
72	Pulleine, H.P. ...	M. M. 2	16-0	65-8 6-3	130-2 30-2	29-1 1-3	22-3 0-8	13-1 1-1	9-3 1-2
3	Ram, E.D.S. ...	L. iv.	14-9	61-1 3-7	107-0 16-0	27-1 0-1	21-5 0-5	12-4 0-5	8-3 0-7
162	Reynolds, S.H.	Rem. (b)	15-9	63-1 2-9	113-5 15-5	29-2 2-2	22-1 0-4	13-3 0-8	8-6 1-2
366	Ridley, G.L.N.	M. L. 2	14-7	57-6 4-6	88-3 8-3	26-5 0-5	20-2 0-2	11-2 0-7	8-0 0-6
216	Risley, J.S.	Up. v.	15-9	64-5 5-2	116-0 25-2	29-0 3-2	21-0 0-5	12-2 0-7	8-9 1-6
213	Routh, E.A.	Rem. (a)	15-4	63-6 5-4	109-0 21-0	28-5 1-7	22-2 1-0	12-1 1-1	8-4 0-9
259	Silver, W.B. ...	M. U. 1	17-5	72-0 4-3	156-2 34-2	31-3 2-8	22-3 0-3	14-1 1-7	9-6 1-3

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.	Chest. in. inc.	Head. in. inc.	Leg. in. inc.	Arm. in. inc.
372	Sinclair, W.H.M.	Up. iv. (a)	14-9	66-5 3-7	151-0 28-0	30-0 2-3	22-4 0-7	14-7 0-8	10-0 0-9
346	Smith, A.M.	L. v.	15-5	62-0 3-8	109-0 16-0	28-2 0-4	21-7 0-2	12-5 0-8	8-4 0-9
351	Stangfeld, C.G.	M. L. 2	12-2	53-3 3-1	72-2 7-4	24-5 1-0	20-7 0-7	10-5 0-3	7-1 0-3
185	Stanton, E.A.	M. U. 1	15-10	66-2 4-8	130-0 24-5	32-8 2-2	21-9 0-3	12-4 0-8	9-1 0-8
118	Stiffe, A.F.E.	M. U. 1	16-2	65-5 5-5	128-7 24-7	29-7 2-8	22-0 0-5	13-5 2-1	9-3 1-8
26	Tait, D.J.	Up. Sh. (b)	13-4	68-7 3-8	131-0 26-2	30-0 3-2	22-0 0-5	13-6 1-4	8-8 1-3
223	Thornton, E.E.D.	M. U. 1	16-2	67-4 5-0	135-0 24-0	30-0 1-3	21-6 0-5	13-4 1-1	9-1 0-8
209	Wainwright, W.L.	Rem. (a)	15-5	63-1 5-0	112-5 20-5	28-8 1-4	21-8 0-6	12-5 0-5	9-0 1-1
545	Watson, G.	M. M. 2	16-10	66-1 5-6	124-7 27-7	30-0 4-0	21-5 0-5	12-8 2-0	9-2 1-7
469	Webber, A.	L. v.	15-11	63-9 6-2	118-5 30-0	30-3 2-8	21-9 0-7	12-0 1-2	9-0 1-8
222	Weston, E.S.	M. v.	16-1	65-9 3-6	130-5 19-5	31-0 2-5	21-6 0-6	13-2 0-8	9-8 1-3
188	Williams, A.F.B.	vi.	16-6	63-3 5-2	106-5 18-5	28-9 2-7	21-7 0-7	12-9 1-1	9-0 1-0

BOYS WEIGHED OCTOBER, 1882, 1883.

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.
247	Barber, W.P.	Up. iv. (a)	14-1	59-6 1-8	97-5 9-5
175	Bardaley, E.J.	Up. Sh. (b)	14-11	62-3 2-0	103-5 2-0
197	Battine, A.J.	M. M. 1	15-3	57-6 1-2	84-5 4-0
281	Bell, A.	Rem. (a)	14-2	55-1 1-5	74-0 2-0
363	Bellamy, A.T.	Up. iii	13-5	57-1 3-4	90-0 9-0

No.	Name.	Form.	Age Years.	Height. in. inc.	Weight. lbs. inc.
264	Bellamy, W.M....	L. iii	12-3	58-4 2-1	94-0 4-0
479	Blackall, T.O. ...	Up. iv (b)	13-9	64-8 3-0	123-5 12-5
381	Browne, F.C. ...	M. L. 2	14-2	63-8 3-3	107-5 14-0
313	Carey, R.W.C. ...	Rem. (b)	14-10	58-5 2-0	89-5 6-5
560	Child, J.F.	Up. iii	13-2	60-8 1-8	93-0 2-0
399	Coldwell, A.W....	L. Sh.	12-9	57-2 3-5	92-3 9-7
312	Cooper, A.S.....	L. iv	12-1	59-7 1-9	85-5 4-0
289	deBoynville, A.C.	Up. iv (b)	15-1	61-0 2-3	91-5 3-5
88	Dolphin, H.E. ...	L. Sh.	11-9	58-6 1-4	90-5 2-5
320	Dowding, W.K....	Up. iv (a)	14-7	65-0 3-0	123-0 12-0
348	Edwards, H.W....	M. U. 2	15-6	59-2 2-1	93-7 8-7
183	Elwell, C.L.S. ...	M. iv	14-2	58-2 1-8	93-7 -2-8
507	Fearon, J.F.	M. M. 1	15-10	63-9 3-0	116-7 15-7
241	Ferguson-Davie, E.C.	Up. Sh. (a)	14-10	62-0 ...	96-0 ...
215	Ferguson-Davie, H.	Up. iv (b)	14-3	53-5 ...	85-5 3-0
445	Girdlestone, A.H.	M. v	14-2	63-0 3-0	108-2 12-7
305	Harrison, C.E. ...	Up. iv (a)	14-1	65-3 2-5	122-5 25-0
121	Hildebrand, A.R.B.	M. L. 2	13-5	60-1 3-1	93-7 11-2
315	Inglis, W.R.	L. iii	13-11	57-0 1-8	82-0 2-0
288	Irving, L.B.	L. iii	11-9	55-6 1-9	75-5 6-5
287	Irving, H.B.	M. iv	13-2	58-8 1-0	87-0 2-5
40	Jones, A.G.	L. v	15-10	65-9 2-1	107-5 8-0
229	Jones, A.W.	Up. iv (b)	15-4	61-8 1-9	107-0 2-0
563	Jowitt, F.McC....	Up. iv (b)	15-5	68-4 ...	151-5 ...

No.	Name.	Form.	Age. Years.	Height. in. inc.	Weight. lbs. inc.
102	Kitcat, S.A.P. ...	M. M. 2	15-2	64-6 2-6	124-0 8-6
316	Laidlay, H.W. ...	Up. Sh. (b)	14-10	60-3 2-1	87-5 3-0
22	Loring, W.L. ...	L. v	15-6	65-6 2-3	119-5 8-3
526	Labbook, A.N. ...	M. L. 1	14-6	63-0 2-6	102-0 13-5
19	MacVicar, C.R. ...	L. v	15-3	64-8 3-8	117-5 17-6
75	Mahaffy, R.P. ...	Up. iii	12-8	57-9 1-6	77-2 2-2
527	Martin, G.E.C. ...	M. L. 1	14-8	65-0 3-8	111-5 4-2
280	Miles, E.H.	Up. v	15-0	66-7 1-2	138-2 4-7
341	Moore, H.	Up. iii	13-11	58-7 1-7	80-0 3-5
282	Moore, E.A.L. ...	Up. Sh. (b)	13-10	64-4 1-4	73-8 5-3
53	Morley, H.L. ...	L. v	15-5	64-3 1-5	110-5 4-5
254	Nichols, A.B. ...	M. L. 1	14-10	60-3 2-6	102-0 11-0
76	Nicholson, C.L. ...	M. iv	15-3	53-5 1-4	70-5 4-0
116	Nixon, F.E.	Up. Sh. (b)	14-0	57-1 2-3	90-5 7-5
581	Pease, J.W.B. ...	M. iv	14-3	61-5 2-7	98-0 10-0
362	Pelham, F.J.T. ...	Up. iii	13-5	57-3 1-8	88-7 7-7
117	Penson, E.A. ...	M. iv	12-10	57-9 2-0	85-5 4-5
583	Percival, H.D. ...	M. L. 2	13-11	61-9 1-6	89-3 6-8
151	Prescott, T.L. ...	M. iv	13-2	61-8 1-4	97-0 3-7
496	Radley, C.P.	Up. Sh. (a)	15-3	66-8 1-3	139-0 6-0
91	Robinson, A.B. ...	abs.			
350	Rolleston, W. ...	L. v	15-1	59-5 1-6	89-0 3-5
238	Sandya, W.B.R.	M. U. 1	15-4	62-2 1-2	85-5 -3-5
65	Spencer, C.G. ...	Rem. (a)	14-7	63-0 1-8	114-0 12-0

No.	Name.	Form.	Age. Years.	Height.		Weight.	
				in.	inc.	lbs.	inc.
330	Stock, C.S.	M. M. 2	15-0	60-8	3-2	111-0	5-0
192	Stedall, B.P.	M. iv	14-6	60-6	1-1	94-0	4-0
302	Thomas, G.F.W.	M. M. 1	15-6	64-2	2-9	109-2	14-2
390	Thoyta, F.G.G.	M. M. 2	13-3	58-0	1-4	91-5	1-5
189	Tribe, C.W.	Up. iv (b)	15-1	59-8	1-8	86-2	5-2
582	Tuckett, P.D. ...	M. iv	14-9	64-7	2-9	116-2	16-2
517	Vickers, R.	M. v	14-4	60-7	...	90-2	...
465	Voss, W.H.	Up. Sh. (b)	15-4	66-0	...	122-7	...
524	Watts, W.R.	M. L. 1	15-6	63-8	...	122-2	...
325	White, H.G.	Up. iv (a)	14-7	57-5	...	87-5	...
326	White, J.S.	L. iii	13-6	52-3	...	66-7	...

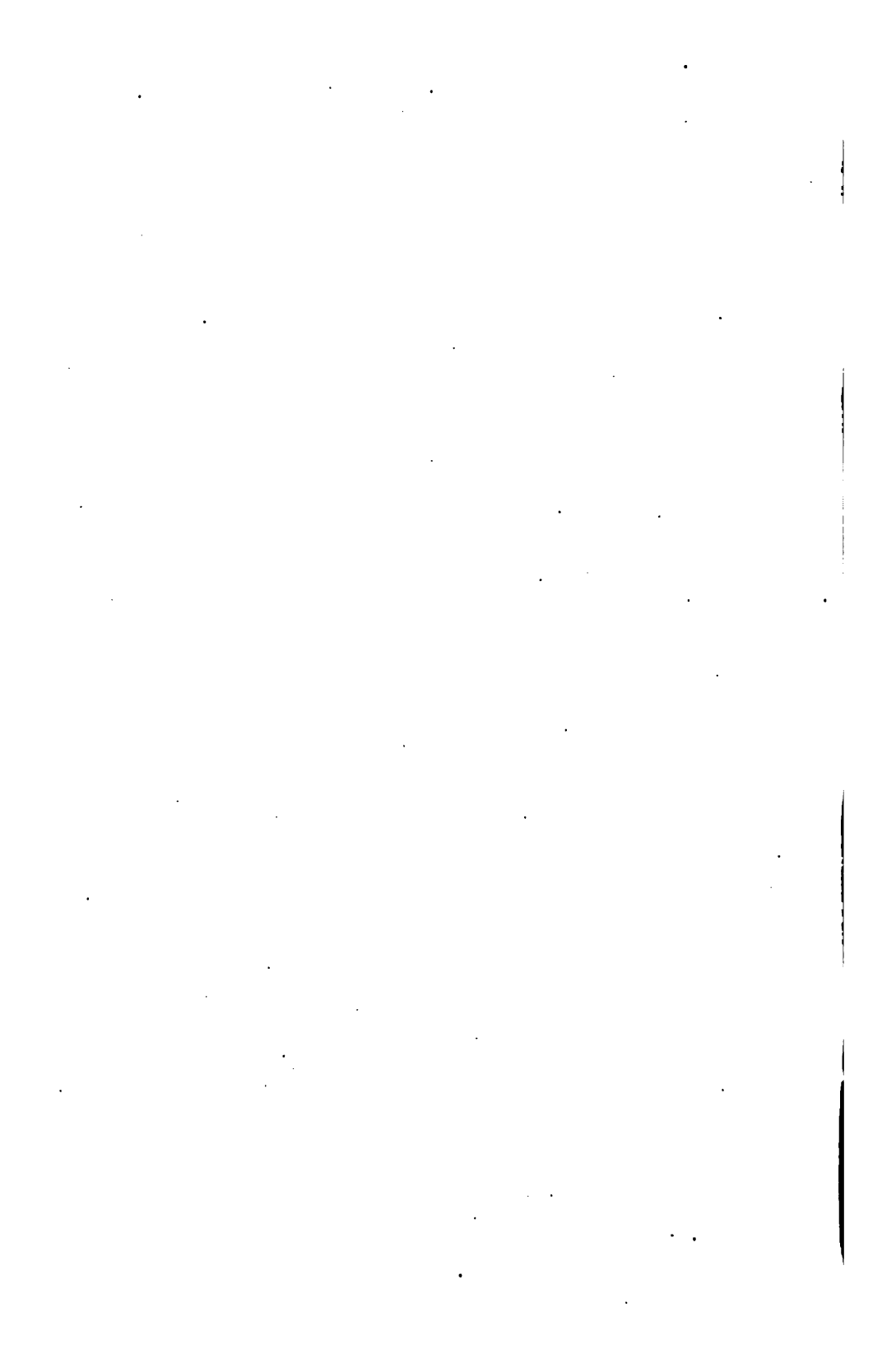
BOYS WEIGHED 1883.

No.	Name.	Form.	Age. Years.	Height.		Chest.	Circumference of			Drawing Near Power. Sight. lbs. 12-in.	Far Sight. 10-ft.	Place of Birth.
				in.	in.	lbs.	Head.	Leg.	Arm.			
597	Alexandroff A.A.	L. iv	13-9	62-1	104-8	26-5	20-5	12-0	7-7	45	14	8 Manchester
219	Alston, J.H.	Up. iv (a)	14-10	59-0	99-0	27-0	21-5	11-7	8-1	43	21	15 Tooting
165	Ash, G.A.S.	L. Sh.	11-1	56-1	81-0	25-1	21-1	10-5	8-0	31	21	9 Co. Derry
290	Atkins, J.B.	L. iii	11-10	55-9	78-0	25-4	21-1	10-5	7-2	32	23	10 Anerley
588	Badcock, F.J. ...	Up. iv (a)	14-7	61-8	97-8	27-0	21-2	11-9	7-4	37	16	12 London
404	Barnes, H.M. ...	Up. iv (b)	14-3	66-0	113-5	23-7	21-3	12-1	8-5	57	24	15 India

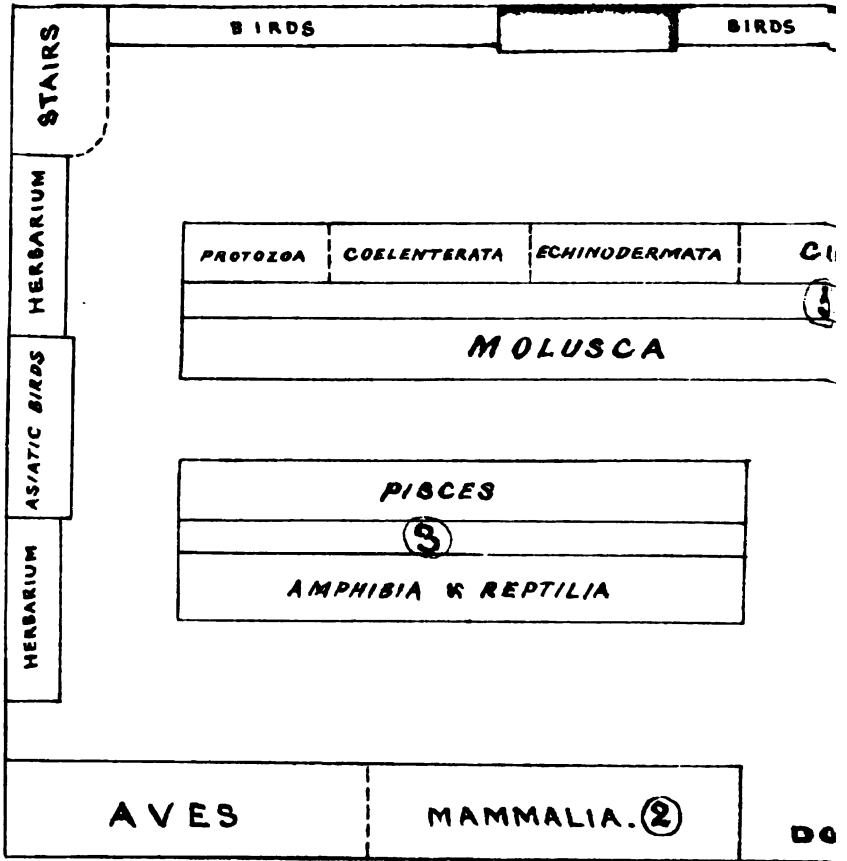
No.	Name.	Form	Age. Years.	Height. in.	Weight. lbs.	Circumference of				Arm. in.	Drawing Near Power. lbs.	Near Sight. 12-in.	Far Place of Birth. Sight. 10-ft.
						Chest. in.	Head. in	Leg. in.					
466	Barnett, C.A. ...	M. iv	13-4	61-9	96-0	26-4	21-1	12-8	7-5	30	7	2½	London
468	Bennett, A.E. ...	L. Sh.	12-3	58-6	89-8	26-2	21-5	11-2	7-6	35	17	8	Southport
56	Benwell, A.	M. iv	14-7	56-9	84-0	26-8	20-8	11-4	7-4	34	21	10	Cheltenham
153	Bigg, L.T.	M. iv	13-3	58-5	76-0	23-4	20-6	10-4	7-0	30	23	11	Cheltenham
237	Blundell, W.A....	Up. iii	13-4	53-6	67-3	25-8	20-6	10-1	6-6	35	13	7	Newport, Mon.
436	Boyson, H.G.P....	Up. iv (a)	13-1	55-5	74-0	25-0	20-9	10-8	7-2	32	19	8	Wandsworth
443	Bucknall, H.M....	L. iii	12-11	57-2	86-5	27-5	20-8	10-8	7-8	41	8½	1½	Lisbon
347	Chappel, W.R.H.	L. Sh.	11-9	57-3	80-0	25-8	21-8	10-9	6-8	33	14	8	Camborne
494	Chichester, A.E.C.	M. L. 2	13-5	62-0	109-2	26-0	20-9	11-8	8-5	43	23	11	Exeter
269	Coke, E.S.	Up. iv (b)	14-11	63-2	103-5	27-8	21-3	11-0	8-4	36	21	10	Chesterfield
516	Cunningham, J.D.	M. iv	14-1	56-1	80-2	26-5	20-0	11-0	7-6	36	18	12	London
58	Drake, H.M.	Up. Sh. (a)	13-9	64-0	119-8	30-0	21-6	11-9	8-6	46	17	9	London
125	Drake, H.M.	Up. iii	13-4	60-3	96-8	29-0	21-4	12-0	7-9	44	18	11	Veryan
591	Dunkerley, F.B.	M. iv	14-9	61-9	92-5	26-5	22-2	10-4	7-1	30	22	10	Timperley
132	Dunn, E.A.	L. iv	13-1	59-6	89-0	25-4	21-0	11-7	6-9	35	21	13	London
28	Eddowes, E.E....	L. Sh.	12-6	56-5	84-2	26-4	21-4	10-9	7-7	46	20	9	Hartford, Cheshire
500	Elder, J.H.C. ...	M. L. 2	13-5	60-4	91-2	26-8	21-0	11-6	7-4	42	12	8	Highbury
224	Fairbairn, T.A....	Up. iii	13-5	60-6	90-5	27-0	21-3	10-8	7-4	40	16	2	Knowl Hill
9	Falkner, C.E. ...	M. U. 2	15-8	63-2	128-2	34-0	21-4	13-1	9-2	62	13	2	London
538	Field, C.D.	Up. iii	13-4	55-9	81-5	27-0	20-9	10-6	8-0	39	27	16	Streatham
164	Finch, H.C.	Up. iii	13-9	56-9	80-2	26-4	21-6	10-6	7-0	33	22	10	Chicheley
290	Forrester, A.L....	Up. iv (a)	12-10	54-4	78-0	26-4	20-2	10-6	7-1	39	9	1½	Malmesbury

No.	Name.	Form.	Age. Years.	Height. in.	Weight. lbs.	Circumference of			Arm. in.	Drawing Near Power. Sight. lbs. 12-in.	Far Sight. 10-ft	Place of Birth.
						Chest.	Head.	Leg.				
						in.	in.	in.				
97	Foyster, B.B. ...	M. iv	14-6	57-4	88-5	26-0	20-5	11-5	7-5	40	21	14 Hastings
394	Frank, H.G.	L. Sh.	11-10	55-0	80-5	26-0	21-0	10-9	7-2	35	13	15 Streetham
273	Glennie, F.F. ...	L. Sh.	11-1	54-4	62-2	23-5	20-8	8-9	6-1	23	20	16 Bickley
378	Gordon, M.H. ...	L. iii	11-3	51-8	70-8	25-5	21-3	10-0	7-2	31	15	8 Harting
5	Graves, A.S.	Rem. (b)	14-8	63-6	100-0	28-7	21-6	11-5	7-0	46	17	6 Cambridge
342	Guinness, R.S. ...	L. Sh.	10-6	53-8	71-3	24-8	20-7	10-3	6-9	31	21	7 Donnybrook
15	Hardy, A.C.	M. iv	13-3	56-8	85-3	26-0	21-4	11-4	7-3	35	9	5 Longdon-on-Tern
11	Hart-Smith, P.L.S.	Rem. (a)	13-10	57-4	89-2	27-0	21-6	12-3	8-0	43	16	4 Wadebridge
159	Hay, E.A.	Up. iv (b)	13-4	60-0	90-2	25-6	21-4	11-3	7-6	1	27	7 London
366	Hayes, T.H.	Up. iii	12-11	54-5	69-8	24-9	20-4	9-6	6-9	29	11	5 York
393	Huckvale, D.A.J.	L. Sh.	11-2	54-6	77-0	26-3	20-6	11-0	7-8	40	13	7 Anerley
423	James, H.S.	Up. iii	11-11	57-7	81-0	25-0	21-6	10-5	7-3	36	24	13 Croydon
561	Jenner, L.C.D. ...	M. iv	13-11	58-6	83-7	26-8	21-0	11-0	7-5	47	15	6 London
367	Kerr, A.C.	L. iv	13-8	60-9	104-3	31-0	21-0	14-8	9-3	45	18	9 Switzerland
1	Koelle, F.T.	Up. Sh. (b)	13-1	54-4	76-5	25-8	21-0	10-5	7-0	53	13	3 Constantinople
430	Lovett, B.D.	Up. iv (a)	13-9	56-2	88-7	26-7	20-8	11-5	8-0	38	21	10 Chirk
274	Luard, C.E.	L. iv	13-11	65-5	124-5	29-8	21-3	13-8	8-7	88	23	13 Farnham
173	Meyrick, S.M. ...	Up. iii	13-7	59-3	86-2	28-3	21-6	11-2	7-2	35	11	8 Ramabury
46	Money, G.E.W. ...	L. iii	11-2	55-4	80-0	26-5	20-8	10-3	7-4	36	18	10 Bakewell
123	Nichols, S.	Up. iii	13-0	53-9	70-0	25-2	20-3	10-3	7-2	36	13	6 New Zealand
186	Owen, G.B.	L. Sh.	13-0	50-3	62-0	24-9	20-5	10-0	6-8	27	18	7 Norwich
83	Paine, J.H.	Up. iii	13-0	55-7	76-5	25-8	20-3	10-0	7-4	33	20	5 Taunton
25	Peake, W.K.	M. iv	14-7	68-8	123-5	29-0	20-9	12-8	8-5	49	20	15 Ellersmere

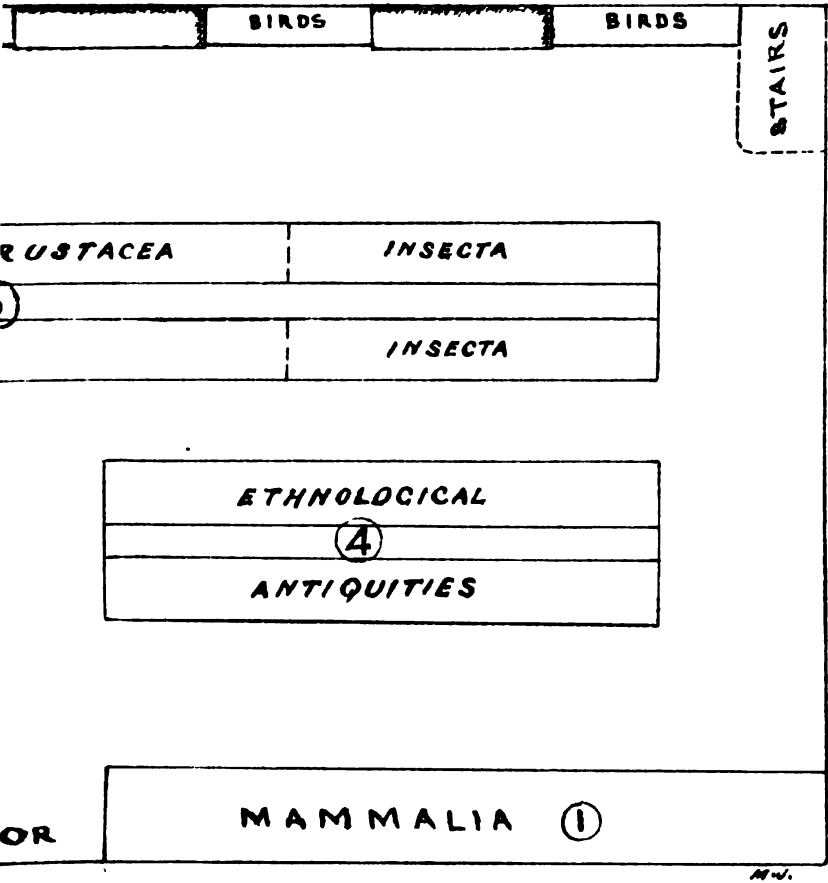
No.	Name.	Form.	Age. Years.	Height. in.	Weight. lbs.	Circumference of			Arm. in.	Drawing Near Power. lbs.	Far Sight. 12-in.	Far Sight. 10-ft.	Place of Birth.
						Chest.	Head.	Leg.					
						in.	in.	in.					
54	Powys, J.	Up. iv (b)	13·3	57·1	86·5	27·4	23·0	11·3	7·5	31	19	12	Malta
460	Prest, S.B.	L. iv	13·11	56·3	87·5	27·5	20·4	12·3	8·5	42	15	10	Cambridge
323	Ronaldson, A.B. L. iii		12·4	58·4	74·5	24·9	21·0	9·7	7·1	31	19	10	Linwood
392	Roupell, E.P.S... L. iii		12·10	58·3	76·8	25·5	20·5	10·0	7·1	44	18	9	Churbury
354	Serastopulo, A.D. L. iv		14·2	61·3	97·0	27·0	21·6	12·0	7·4	45	25	12	Baywater
532	Shorell, J.H. ... M. L. 2		14·6	59·4	98·7	26·1	21·4	11·7	8·0	44	15	6	Oldbury
278	Smith-Neill, F.J. M. L. 1		13·6	59·5	88·5	25·5	21·0	11·4	7·7	44	19	10	Calcutta
535	Stone, B.W. M. L. 1		14·1	60·7	107·0	23·5	21·4	12·0	8·2	50	23	9	Birmingham
18	Swinhoe, A.C. ... L. Sh.		12·0	56·7	80·2	25·5	20·8	11·0	7·1	46	15	9	New Swindon
523	Taylor, F.P.S. ... Up. iv (b)		14·3	62·3	110·7	28·5	21·0	12·0	8·8	35	17	9	India
424	Tiarks, H.F. M. iv		13·8	60·9	103·5	28·6	22·2	11·7	8·4	41	24	10	Balham
401	Valentine, A.L.W. L. Sh.		12·2	57·0	89·2	27·2	22·5	11·3	7·8	37	12	10	Kensington
23	Warman, A.S. ... Up. iv (a)		13·2	55·9	77·0	24·0	21·3	10·8	6·9	33	25	10	Richmond, Yorks.
473	Wade, T.S.H. ... M. U. 2		14·5	61·4	104·5	28·5	21·2	12·3	8·7	53	17	10	London
290	Waterlow, W.A. L. Sh.		12·5	59·0	90·5	28·8	21·5	11·8	7·7	32	23	10	London
579	Watson, T.H. ... Up. iv (a)		14·3	63·8	126·0	29·5	22·1	12·7	9·3	55	24	10	Edinburgh
62	Weston, C. M. L. 2		12·8	58·9	93·7	26·5	22·2	11·0	8·4	45	23	11	Abbey Wood
553	Whitstone, B.A.W.L. v		14·4	60·8	89·0	25·5	21·7	11·4	7·2	54	16	6	Micheldever
31	Wilson, A.T. Rem. (b)		13·10	63·6	101·0	27·9	21·8	11·5	7·5	42	23	9	Basingstoke
391	Wood, W.C. L. iv		12·9	58·1	85·7	26·0	20·9	10·2	7·0	36	20	10	Marlborough
432	Woolright, A.P. M. iv		13·11	65·1	126·0	30·8	21·6	13·3	9·6	53	23	12	Barnes
512	Worthington, G.V. M. iv		13·4	59·4	83·7	26·6	21·0	10·9	6·7	41	17	10	Lowestoft
470	Yeates, H.W. ... M. iv		13·3	59·9	95·3	28·5	20·9	11·2	7·7	51	17	3	London



MARLBOROUGH CA
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Handbook to the Museum.

It has been endeavoured to avoid mentioning any animal or structure which cannot be seen in the Museum; and hence all figures are omitted in this Guide. Whenever any particular structure has been described, but no illustrated specimens occur in the Collections, they will be supplied as soon as possible; in these cases they were mentioned because there was every probability that they would be obtained before the end of the Term.



THE MUSEUM.

The Museum is intended to contain a Typical series of animal life from Man down to the lowest animal, and consequently only one or two representatives of each Family (the most characteristic that can be obtained under the circumstances) are exhibited. This series is contained in the cases 1, 2, 3, and 5. Case 4 contains a variety of Ethnological and Antiquarian objects; and against the wall under the windows are various cases of birds, the top row of which is intended to be ultimately occupied with as complete a set as possible of Marlborough birds. At one end of the room is a large case of birds from Central Asia, collected by R. B. Shaw, C.S.I., an Old Marlburian, and presented to the College by his Sister, as a Memorial of him. On each side of the bird case is the Herbarium, consisting of a very fine series of European plants, collected by the late G. C. Joad, Esq., and presented to the College by the Director of the Royal Herbarium at Kew; and also a set of British plants, as well as a set of Marlborough plants.

In the gallery are the collections of Fossils and Minerals, and a fairly typical set of Coins.

The collections of Moths and Butterflies, of Beetles, and of Birds' eggs, are in cabinets at the end of the room opposite the Herbarium.

Before entering upon the question of the arrangement of Animals, it will be necessary to explain what is meant by saying that one animal is "higher" or "lower" than another.

If we look at the carcass of a sheep, for instance, as it is seen when hanging up in a butcher's shop, we shall see that it consists of the flesh of the

animal, enclosing an elongated hollow space, which, when the animal was alive, contained the heart, lungs, stomach, and other organs; this hollow space is called the "body cavity." The various organs mentioned above, are distinct from each other and can be separately removed from the body. The space occupied by the heart is called the heart-space, and in like manner we say that there is a lung-space, a stomach-space, and so on; thus the animal may be considered to consist of a body cavity with various "spaces" partitioned off from it by membranous walls.

But besides this body-cavity there is also a canal which can only be seen when looking at a skeleton; the whole framework of the animal is then seen to be supported by a series of small bones, placed end to end, and so united to one another as to cause it to be called the "backbone," or vertebral column, though really consisting of a large number of small bones called vertebrae. Now this backbone, besides being useful for supporting the frame-work of the body, is also important in another way; if each of the vertebrae be examined separately, it will be observed that it is perforated by a large hole in such a manner that when the vertebrae are placed end to end as in the body, a canal is formed, and this canal is connected directly with the skull at one end. Now the skull contains the brain, which, as we all know, is the source of all our powers of sensation and movement. The canal formed by the vertebrae is occupied by a white cord; this is the spinal cord, and it may be considered to be a prolongation of the large nervous centre, the brain. Nerves proceed as white cords of various sizes, both from the brain and also from the spinal cord; these nerves govern the motions and sensations of the whole body. From the spinal cord nerves pass off at the junction of each of the vertebral bones; these spinal nerves are composed of two roots, one posterior, and the other anterior. The posterior root conveys sensation or feeling, and the anterior root is a nerve of motion; they join together soon after leaving the spinal cord, and so the nerves of sensation and motion are combined and regulate the various functions of the body. We see then how important this spinal cord is, being in fact as important as all the other organs together, and we may therefore call the canal formed for it by the vertebrae the "nerve-canal." But besides this spinal cord, we have other nerves, which may be called "involuntary," or "sympathetic" nerves, those over which we have little or no power, as for instance those by which we are able to breathe, or to digest our food; for the movements of our chest for instance in breathing are quite involuntary, and if we want to "hold our breath" we have to make special exertions to do so, and these exertions can only be continued for a limited time. These nerves are not contained in the nerve-canal, but in the body-cavity, so that, though an animal may have nerves, they need not necessarily be in the nerve-canal, nor need it have

a nerve-canal at all. A body of the *highest* type may therefore be considered to consist of a body cavity and a nerve-canal, with their appendages, and it is evident that an animal with only one of these is "lower" than one which has both, supposing that each has all its proper appendages. And this enables us to make two grand divisions, for one set has both body-cavity and nerve-canal, the other only the body-cavity; and as the nerve-canal is made up of vertebrae, the former class is called VERTEBRATA, whilst the other is called the INVERTEBRATA.

Again an animal which has no lung-space is lower than one which has one, or one with a heart-space higher than one without (supposing them to have the rest of the "spaces" in the body cavity); but it is a question whether an animal wanting only a heart-space is higher or lower than one wanting only the lung-space, and this becomes much more difficult as the question becomes more complicated, as when one animal has only heart and stomach and another only heart and lung; and it is in this way that the Classification of animals is so difficult, and so variable; for what one Author may consider most important another may not; and as our knowledge is continually increasing, opinions have to be modified from time to time, and an arrangement, which holds good at one time may have to be considerably altered at another. The arrangement followed in the Museum is that of Dr. Nicholson, Professor of Natural History in the University of Aberdeen, as being the most recent and the most complete, and very free use has been made of his "Manual of Zoology" in drawing up these remarks.

From the foregoing remarks it will be observed that certain structures are associated with certain important functions, with which at first sight they have apparently little to do (i.e., as far as the *name* of the structure conveys any information), and hence, in the Tables which may be given, a certain structure, which is selected for a special point of classification, must not be taken as in itself necessarily a really important structure, except in so far as it indicates other characters of more real importance, which can only be understood by a careful study of the animals themselves. Nor must it be taken for granted that the characters selected for forming the Tables are universally applicable; they are chosen as giving the most general idea of the characters of that particular set of animals, and for the purpose of simplifying the matter as much as possible.

Though only one point (that of having a backbone) has been taken for the purposes of classification, there are several other points in which Vertebrata are distinguished from other animals; they have their hard parts (the bones) inside whilst Invertebrata have theirs outside, (the case of Turtles and Tortoises will be explained hereafter); they have red blood as opposed to the white blood of Invertebrates; and when limbs are developed, they are never more than four in number.

Having then divided animals into two sets by the presence or absence of a Backbone, we can take the latter set and divide it into two by separating those which have a body cavity from those which have not.

Then we can take those with a body cavity, and divide them into two more divisions, according to their means of progression. Some have jointed legs as in the case of Insects, and some have suckers, which are extended or retracted by means of water; the suckers are connected with a series of tubes, so arranged that the animal can force water into them when it wants to extend the suckers, or drive it out when it wants to retract them. This system is called the "Water-vascular" system, and it may be here remarked that animals with this water-vascular system have their nervous system arranged in a circle round the mouth, with branches spreading from it to the different parts of the body. Animals so constructed are said to be "radially symmetrical," and radially symmetrical animals can be again divided into two sets, one of which has and the other has not a water system; to these latter belongs the Sea Anemone, with its tentacles spreading round the mouth as if they were rays.

This radially symmetrical arrangement again is to be distinguished from that in which there are right and left sides, which is called a bilateral arrangement; and animals so formed can be arranged in two sets according to the structure of the body, one set having it made up of a series of rings, connected together by a flexible membrane, the other having soft bodies without any trace of rings.

We then have six Sub-kingdoms of animals, which may be tabulated as follows:—

Animals with a backbone	Vertebrata.
Animals without a backbone	
Animals with a body-cavity	
Animals bilateral (with right and left sides)	
Body not made up of rings	Mollusca.
Body made up of rings	Annulosa.
Animals radially symmetrical,	
Animals with water vessels	Echinodermata.
Animals without water vessels.....	Coelenterata.
Animals without a body-cavity	Protozoa.

Vertebrata may be divided into two sets, those which bring forth their young alive, and are therefore obliged to suckle them at first, hence called Mammals, and those which lay eggs. In some few cases the eggs are never deposited, but are hatched within the body of the female, but in these cases the young are perfectly formed when they come from the egg, and are thus quite distinct from the young of Mammals.

Of those which lay eggs there are two main groups, the Ichthyopsida, which have gills, at least at some period of their life, and the Sauropsida, which never have gills.

Of the Ichthyopsida there are two classes, the Fishes and the Amphibians; the former never have lungs, and their limbs are always in the form of fins; in the latter, the adult always has true lungs and the limbs are never in the form of fins, and even if a fin is ever produced, it never has any rays.

The Sauropsida are also divided into two classes, the Birds and the Reptiles. Different as the two are they yet have many important characters in common, but they presuppose a knowledge of anatomy, and it will therefore be sufficient merely to indicate the main points of difference between them.

Animals which suckle their young Mammalia.

Animals which lay eggs

Those which never have gills

Those which have feathers, wings, and warm blood Aves.

Those which have scales, no wings, and cold blood Reptilia.

Those which have gills, at least at some time of their life

Those which have lungs, and limbs not like fins Amphibia.

Those which never have lungs and only fins Pisces.

MAMMALIA are classified by the means they have for obtaining their food, as this must in a great measure affect the structure of their body. It is evident that an animal which feeds on grass does not want claws, or one which feeds on flesh cannot use hoofs for catching its prey; hence the structure of the foot is taken as a first means of classification. Yet simple as this appears at first sight, we meet with difficulties, if we consider this character alone, for a herbivorous animal may want to dig up roots and then claws will be useful. We must therefore bring in the structure of the teeth, as this will more effectually point out the nature of the food.

In man, there are three kinds of teeth, the front ones for cutting, and hence called incisors, four in number; next comes, on each side, a rather more pointed tooth, and as this is largely developed in the dog, it is called the canine tooth, and behind the canine tooth come the flat-topped teeth, used for grinding the food, and hence called molars, of which there are five on each side of each jaw. The two front molars are smaller than the other three, and have not so many fangs, and are known by the name of pre-molars. Thus there are in man 8 incisors, 4 canines, and 20 molars, or 32 in all. The teeth, as may be supposed, vary extremely in different animals, and have supplied a very good means of classification, and on these the following Table has been based.

[illegible]

This is the system of Cuvier, and must be regarded as only *approximately* true. The animals are not placed in their proper rank, as the Edentata, for instance, come last of the Mammalia; but the Table will serve to give some idea of the primary points of classification. Only *external* characters have been here selected, but naturally when the internal anatomy is taken into account, important modifications in the Table must occur.

BIMANA.—Man. The most striking point about the human skeleton is its height, and it will be observed that this height is mainly due to the great length of leg; it is now the generally received opinion that very tall people are not larger in body than those of ordinary size, but only in the length of limb.

The skull of a child, with the front portion of the jaws removed so as to show the process of dentition, is also worth notice. The young front teeth are formed *beneath* the first ones, and as they grow they press upon the fangs of the first set, and thus cause their absorption, so that the crown easily falls away, and the tooth is replaced by the second one. In the case of the back teeth, the young jaw is too small to receive them in their fully developed state, and they are consequently not "cut" till the jaw has grown sufficiently. The last of these teeth are sometimes not pushed through till almost middle life, and always cause considerable pain during the process, and are called "wisdom teeth."

QUADRU MANA.—Monkeys. At present there are only a few skulls of different species, the most important being that of a female Gorilla. On comparing this with the skull of a Man, placed near it for that purpose, it will be seen how the animal powers are developed at the expense of the mental; the enormous ridges over the eyes, making the animal appear as if it had no forehead, the large aperture for the nose, the large arch on each side of the face for the strong muscles working the lower jaw, all give the impression of brute power. In the male these peculiarities are much more developed, as well as some large ridges along the top of the skull, proving it to be a much more formidable beast.

INSECTIVORA. These animals are characterised by a long pointed head and sharp conical teeth; none are of large size, the Hedgehog being one of the largest. The little Centetes, or Madagascar Hedgehog, is a very characteristic species, though almost too small to be easily seen in the case.

The structure of the teeth is alone a sufficient proof that the hedgehog cannot suck cows as they lie down; it is not only a useful but also a perfectly harmless animal.

The most abundant of the Insectivora are the Shrews, very similar in appearance to the mouse, from which, however, they are essentially distinct. Shrews are found in all parts of the Old World, as well as in North America. At present we possess only the common Shrew (*Corsira vulgaris*), and the water Shrew (*Cróssopus fodiens*). The common Shrew is far more common than would at first sight appear; its teeth are very remarkable, and similar at first sight to those of the mouse, but their mode of growth is entirely different.

The Shrew has also a very disagreeable smell, very strong in some species, it being stated that the "Musk-rat" of India will actually taint the wine inside a glass bottle if it only runs over it outside! This unpleasant smell has brought much persecution upon it, especially in former times, as it was considered to be more poisonous than a viper, and even its touch to cause all sorts of maladies. It feeds on insects and worms, and possibly slugs as well. It is extremely pugnacious, two shrews rarely meeting without a battle, when the weaker is killed and eaten.

The death of numerous Shrews in the autumn, when the country roads and bye-paths are frequently remarkable for the number of their dead bodies, without any sign of external injury, has never been satisfactorily explained; some have attributed it to starvation, the worms having gone down too deep into the ground to allow the Shrews to get at them, and the cold making the insects retire out of reach. This seems to be hardly a sufficient reason, as the weather is not so cold when these dead Shrews may be found. The country people declare that a Shrew cannot cross a high road, and certainly G. T. K. Maurice saw one fall dead when it had got half-way across. Among its enemies may be mentioned moles, cats, weasels, and owls, but from its strong smell moles and owls alone seem to eat them; owls especially make great havoc among them.

The Water Shrew is sufficiently distinct to be classed in a separate genus. It is a very lively little animal, and when in the water is covered with bubbles of air, giving it a very beautiful appearance. It swims with alternate strokes of its hind feet, and its course is consequently somewhat of a wriggling character. It feeds on aquatic insects and crustaceans, as well as frogs, fish, and even small birds and quadrupeds,

CHIROPTERA.—Bats. So called because the bones of the fingers are enormously lengthened and connected by a very delicate membrane so as to enable the animal to fly. The thumb is short and terminates in a hook; the toes are also short and end in hooks, whereby the animal is able to hang from any projection when at rest. The membrane of the wings, as well as that of the ears and nose, is extremely sensitive, so as almost to stand in the place of eyes. Animals, which have been cruelly deprived of eyesight, have flown about a room avoiding all kinds of obstacles placed in their way. The hind limbs are also united by a similar membrane which acts almost like a hand when the animal is flying, for it is able to hold a moth in this bag and eat it as it flies along. Most bats eat insects; some few are blood-suckers; and some as the *Pteropus*, of which a specimen is exhibited, eat fruit.

The **RODENTIA**, though varying considerably in form, are recognised at once by the structure of their front teeth or incisors. The tooth of a man consists mainly of a substance called dentine, similar to, but softer than,

bone, and covered externally (where not covered by the gums) with a layer of very hard enamel; the tooth also as soon as it has reached its full size, ceases growing, and if it is lost, is never replaced. The front teeth of Rodents, which are constantly used for gnawing (whence the name), are formed of a mass of dentine, but covered only *in front* with enamel, so that as the teeth work on one another, the dentine wears away faster than the enamel, and a chisel-like edge is constantly preserved. The tooth also never ceases growing, but is constantly renewed from a "persistent pulp," and thus as long as the animal is in good health its teeth are always in proper order. Should, however, one of the front teeth get misplaced either by accident or other injury, it will not work on the opposite one, and thus not be worn down; the consequence will be that it will still continue to grow, and as the incisors are curved so as to form segments of circles, the teeth will grow in the form of circles, until the animal will be unable to close its mouth, and will thus run every chance of being starved. We have the skeleton of a Rat in which the teeth are so malformed, and also the head of a Hare, in which the lower incisors have grown out straight, instead of taking their natural curve, and the upper incisors have consequently grown into a circle. It should be stated, however, that in this latter case the lower incisors were accidentally broken off, and have been replaced artificially from memory, so that the actual direction of the lower teeth may not be quite correct.

Another important point connected with the jaws must also be noted; a man, living on both vegetable and animal food, has the power of moving his lower jaw in almost any direction, backwards and forwards and from side to side. Carnivorous animals, not wanting to *chew* their food, can only lift their lower jaw up and down, and have no power whatever of moving it from side to side; a Cow on the other hand moves its lower jaw from side to side in order to chew its food; a Rodent moves its jaw backwards and forwards; the point of the skull, therefore, where the lower jaw is attached to it, is modified in each case, to allow of these different movements.

On referring to the table, it will be seen that Rodents have no canine teeth, consequently there is a great space between the incisors and molars, and this, with the peculiar formation of the incisors and the shape of the cavity in which the lower jaw works, ought always to be sufficient to enable anyone to tell a Rodent's skull at first sight.

Rodents are almost all small animals, naturally feeding on vegetable food, and are divided into numerous families. The Rabbit family is known by having two small extra teeth just inside the two upper incisors, though they do not appear to serve any special purpose. Besides specimens of the wild and tame Rabbit, there are specimens of the Irish hare, and the Arctic

hare, remarkable for its large size; as well as the head of the Egyptian hare with its unusually long ears.

Of the Caviidæ there are at present only a skeleton of the Agouti and the skull of the Capybara or Water-hog. In the former it may be observed that the collar-bone is wanting, and this shows that the animal does not use its fore-limbs for holding or for burrowing. It is found in Guiana, Brazil and Peru. The latter is the largest of living Rodents, also South American. It is from three to four feet long, and is semi-aquatic in its habits. The incisors are enormous, and the molars very similar to those of the Elephant.

Of the Castoridæ is a specimen of the Beaver, remarkable for its broad, flat, hairless tail, with which it strikes the water for the purpose of giving an alarm. The Coypu Rat, of which a skeleton is exhibited, is similar in many respects to the beaver, but its tail is rounded, not flat, and it is only about two feet in length. It will be noticed that it has very well-developed collar-bones, and therefore is able to use its fore limbs for carrying. It is found in Central America, and is much esteemed for food. The third representative of this family is the Musquash, Ondatra, or Musk-rat, very much smaller than the two former, but with a round scaly tail as in the Agouti.

The next family represented is the Muridæ, of which there are no less than 300 species known, extending over the whole world, except the Islands of the Pacific. They are allied to the beavers in having scaly or nearly hairless tails and well developed collar-bones. Specimens of the Common Rat Water Vole, Common Mouse, Field Mouse, Harvest Mouse, and Grass Mouse are exhibited.

Of the Sciuridæ, or Squirrels, two species, the Siberian and Carolina Squirrels, are exhibited. The family is well distinguished by its bushy tail and well developed collar-bone.

CARNIVORA.—These are divided into three groups, according to the manner in which they walk, viz., those which walk on their toes, as the cat and dog; those which walk on the sole of the foot, as the bear and badger; and those whose limbs are unsuited for walking on land, though useful enough in water, as the seal. There is also another group, intermediate between the two first, viz., the Weasels, sometimes called Vermiformes, from the long narrow body, which is so characteristic of the group. As regards their teeth it may be observed that the front teeth (or incisors) are small, and apparently of little use; those which come next, the canines, are largely developed, forming formidable tusks, and the back teeth (or molars), which in man are flat at the top, are modified, so as to form a sharp ridge, so that the upper and lower molars work on one another like a pair of scissors. In the case of the bear, and those animals which live on vegetable as well as animal food, the molars

are much flatter at the top, and it may be here remarked that the more purely carnivorous an animal of this order is, the shorter is the face. This is well seen in the case of the cat and the dog. It may also be noticed how much larger the arch on each side of the skull is in the former than in the latter; and also how some animals have a much larger ridge along the top of the skull than others, this ridge being a very good index of the ferocity of the animal; even in the case of dogs this ridge is much more prominent in some individuals than in others.

Besides the specimen of a Cat, there is a very fine Cheetah. The Cheetah, or Hunting Leopard, inhabits the greater part of Africa and Asia. It is hardly a typical specimen of the cat tribe, as the claws, which in the cat can be drawn back between the toes, and thus give a rounded appearance to the paw, are only slightly retractile in the Cheetah, and are consequently more worn at the points; this makes the paw narrower and longer, and more like that of the dog. This difference in the paw also makes a difference in the shape of the body, for the paws being unfit for climbing, the muscles used for that purpose are less developed, and this makes the body more long and slender than that of the leopard, which is about the same size, and more similar to that of the greyhound. In the wild state the animal has a mane and rough coat, but when domesticated the mane is lost, and the coat becomes smooth. The Cheetah is easily tamed, and its disposition is frank and confiding; its voice of pleasure is a purr, of uneasiness or hunger a short reiterated mew.

The Wolf is spread through Europe and parts of Asia, and has been very rarely tamed. It is so habitually cautious and suspicious that it is difficult to take it in traps, and for the same reason anything like the appearance of artifice deters it from an attack. The power of the muscles of the head, neck, and shoulders is immense, and its bite is terribly severe, generally cutting out the flesh with a snap. It is said that wolves wounded by the gun of travellers, or hunters, are torn in pieces by their fellows, and hence, when a traveller is pursued by a pack of wolves he tries to wound, and not kill; every time he fires, as each one is wounded, the others stay to pull it in pieces and thus the traveller gains time.

The Fox was found dead near Marlborough, and the pate hanging up is that of one killed in the Racquet Court.

Of the WEASEL tribe there are specimens of the Egyptian Ichneumon, an animal feeding on snakes, lizards, birds, crocodiles newly hatched, and especially crocodiles' eggs. It is easily tamed, and is a very useful animal if kept from visiting the fowl-roost. The Mongoose or Indian Ichneumon, is very similar to the Egyptian in its habits, and is often tamed. As long as the tamed animals are kept from meat, they are great pets, but their nature seems to change entirely the moment they are fed with meat.

Of the British species of this Order are the Polecat, Stoat, Ferret, and Weasel, and of these the Polecat and Ferret are considered by some Naturalists to be the same species; the former, however, inhabits temperate and Northern Europe, whilst the latter is really a native of Africa, having been imported into Spain and then spread (as a domestic animal) through the rest of Europe. Even now it requires to be kept warm in winter, being unable to stand the severity of our climate.

Weasels, though destroyed by gamekeepers, are really very useful animals; their proper food consists of rats and mice, and some farmers therefore encourage them to live about their farms, the occasional loss of a fowl being well compensated by the large destruction of rats and mice.

The Stoat is a larger animal and preys on larger game, which, like the Weasel, it follows up by scent. It becomes partially white in winter, and in more northern regions this change is complete, the tip of the tail alone remaining black; in this state it is called the Ermine.

The Otter forms a connecting link between the Weasels and Seals. It is distinguished by a peculiar breadth and flatness of the head and the rounded outline of the muzzle. The eyes are protected by a "nictitating membrane," i.e., a membrane which they can draw across the eye to sweep off all impurities, particularly noticeable in the Owls. The tail is rather flattened and forms an admirable rudder when in the water. The feet are webbed, and its movements on land are by no means rapid, and hence it generally takes to the water for safety. It generally devours one fish before giving chase to another, but sometimes it manages to bring up several at once, being not only able to seize them but also to carry them hanging from its mouth. Eight or ten moderate sized fish serve for a meal, but in a state of nature they eat only the head and upper part of the body, hence some idea may be formed of the havoc occasioned by a pair of Otters in support of themselves and their young. When fish are scarce the Otter will feed on frogs and water-rats.

The Wolverine, or Glutton, is sometimes classed with the Weasels and sometimes with the Bears. It is closely related to the Bears, but is not truly plantigrade, and in its dentition it is properly a Weasel. It is an inhabitant of the cold regions of America, and is so called from its insatiable voracity, though according to some Naturalists this is not the case and the name has been wrongly applied. "Slow in its movements, it makes up by perseverance and industry for this defect, and at a steady pace pursues its prey for miles, hunts out weak and dying animals, and destroys hares, marmots, and birds, which it seizes unawares." "It will follow the Marten Hunter's path round a line of traps 40, 50, or 60 miles, and render the whole unserviceable merely to come at the

baits, which are generally the head of a partridge or a bit of dried venison. They are not fond of the Martens themselves, but never fail to tear them to pieces or to bury them in the snow by the side of the path at a considerable distance from the trap. Drifts of snow often conceal the repositories thus made, in which case they furnish a regale to the hungry fox, whose sagacious nostril guides him unerringly to the spot."

The Badger is closely allied to the Bears, as it is truly plantigrade, placing the whole of its foot on the ground as it walks; but from its dentition it might be classed with the Weasels, which family may therefore be made to include a variety of different types of animals. It is the largest of the British Carnivora, and is perfectly harmless, its food consisting of roots, fruit, eggs, small Mammals, frogs, insects, &c.; it is also fond of Wasps' nests, as wells as those of the wild Bee. It is nocturnal in its habits, and very shy and retiring; but though so timid, it will, when pressed, prove a very formidable antagonist, and Badger-baiting was formerly a very common sport. The power of its jaws is immense, the lower jaw being so fastened to the skull, that it cannot be separated without breaking one or the other. There is also an enormous ridge along the top of the skull, which is thus protected with a very thick layer of muscle, and it is consequently impossible to break the skull of the animal when alive by a blow on the top of the head. The specimen exhibited was captured at Rockley, but so much is this poor animal persecuted that there is every chance of its ceasing to be a Marlborough or even a British species in a few years.

We now come to a group of Orders, of which there are very few existing representatives, but which were formerly very numerous, and of most extraordinary forms. Two of the five orders alone remain, and of these only two or three species in each. They are the Proboscidea and Hyracoidea.

Of the PROBOSCIDEA or Elephants, we have only the skull, tooth, and tail of the Indian Elephant, and teeth of the fossil Mammoth and Mastodon.

The Skull of the Indian Elephant is shown on the top of Case 4, and a section in Case 1. It is remarkable for its high forehead, and yet when cut in half, the brain cavity is singularly small, not larger than twice that of a man, the high forehead being obtained by the development of a large amount of bony cells, so as to afford a broad surface for the attachment of the muscles of the trunk. It will be noticed how this cellular space also forms a wonderful protection to the brain, a bullet, unless fired in a particular direction, being unable to penetrate the brain, but only remaining embedded in the cellular space. The teeth are, however, the most interesting part of the skull. Each tooth, except the two canines (which are developed into the well-known tusks) is made up of a series of what may be called flattened "toothlets." Some of these "toothlets" may be seen beside the skull, as

when not fully developed, they are quite separate inside the jaw. Each "toothlet" consists of a mass of dentine coated with enamel, and before appearing outside the jaw they are all united into one large tooth by a cement, harder than dentine but softer than enamel. Strictly speaking, there is only one such compound tooth fully developed on each side of each jaw, so that the animal has only four molars to work with. But they are so placed that the Elephant uses the front part of the tooth more than the back part, and consequently the front part gets worn away first. As the tooth thus gets worn away, it is continually pushed forward by another one which is being formed behind it, and thus at length the animal has parts of two teeth at work on each side of each jaw. In course of time, the whole of the first tooth is worn away and is replaced by the second tooth. This replacement may take place no less than six times, each succeeding tooth being larger than the former; and in this way the Elephant is said to have six molar teeth on each side of each jaw.

The tooth of the Mammoth is formed in the same manner, and from actual specimens which have been found embedded in the ice, it is found to be an animal very similar to the Elephant, but covered with thick hair. The Mastodon had very different teeth, as will be seen from the specimen exhibited; some species of Mammoth had no less than four large tusks.

The small Order HYRACOIDEA contains only two or three species, one of which inhabits Syria and is supposed to be the Coney of Scripture. One species, that exhibited, is found at the Cape, and is called by the colonists the "Badger." It is a curious animal, being in some points, especially as regards the molar teeth, similar to the Rhinoceros, near which it is generally placed in systems of classification. Its upper incisors are like those of a rodent, continually growing, whilst the lower incisors are directed forwards, and have no continuous growth. It has four toes on its fore and three on its hind feet, furnished with hoof-like nails, and has no collar bone.

Passing over three orders of fossil animals, we come to the most important, as well as the largest order of Mammals, the Ungulata.

The UNGULATA are divided into two grand divisions, the Artiodactyla, or even-toed Ungulates, and the Perissodactyla or odd-toed Ungulates.

The Artiodactyla are divided into two sections according to the structure of the molar teeth. In one set the molar teeth have "tubercular" surfaces, i.e., the upper surface is raised into rounded elevations or tubercles; in the other the upper surface is flat and the enamel curiously waved, so that, as the lower jaw moves from side to side against the upper, the tops of the molars form very perfect grinding surfaces. As is so often the case, this single difference is indicative of other and more important ones.

To the former section belong the Hippopotamus and Pigs; to the latter, the large families of Oxen, Sheep, Goats, Camels, Giraffes, Deer, &c.

HIPPOTAMIDÆ.—From the skull of the Hippopotamus may be obtained a general idea of the heavy, blunt, shape of the head. The teeth placed beside the skull do not really belong to it, but yet form a complete set (except the molars) by themselves. The lower incisors project horizontally, the canines are large and curved, the lower much longer than the upper, and with sharp chisel-like edges at the top. The skin is very thick, as may be judged from the specimen exhibited. There are only two kinds of Hippopotamus now living, the one generally known, the other very rare, inhabiting the west coast of Africa.

The **SUIDÆ** are closely allied to the foregoing, but two of the toes are are much shorter than the others and hardly touch the ground. The canines are always large and generally very formidable; the lower incisors project almost horizontally. The shape of the skull is what is called "pyramidal," rising to a considerable height at the back. The skull of the Babroussa is interesting from the extreme development of all four canines and from the two upper ones being turned upwards, even the socket being so turned, and the tooth penetrating the upper lip in the male. The Peccary is the representative of the family in the New World, it is peculiar from having only three toes on its hind feet and no tail.

The **RUMINANTIA** form an extensive and natural group; they are so called from the structure of the stomach. On referring to the model of that of a Sheep, it will be observed to be divided into four compartments, separate from one another. The food after being taken into the mouth, is passed almost directly into the first stomach, the "rumen" or paunch (the largest of the four), lined inside with numerous hard warts or "papillae," where it is moistened and allowed to soak for some time. Close by the rumen is the second stomach, the "Reticulum" or honey-comb bag, with its inner surface divided into numerous shallow cells. The true function of this reticulum is very much disputed, but certainly the food, after passing from the rumen to the reticulum, is sent up into the mouth in pellets and there properly chewed. It then, on being swallowed, passes direct into the third stomach, the "psalterium," "omasum," or "manypplies," the name being derived from the peculiar appearance of the folds inside, something like that of the leaves of a book (in fact it is often called the "Book" by the butchers). Here some of the fluids are absorbed and it then passes into the fourth stomach, the "abomasum," or "reed," which secretes the true gastric juice, and where digestion is fully completed. In the Calf this stomach secretes a peculiar acid, which has the property of turning milk into whey, and when dried goes by the name of rennet.

In the young animal, as it does not chew the cud, this stomach alone is fully developed.

Another peculiarity of Ruminants is the "cloven foot." This really consists of two toes, the bone above them, to which they are attached (called the "cannon" bone), though apparently only one bone, is really composed of two united together, as may be seen from the section of the cannon bone exhibited. In most cases besides the two "functional" toes, as they are called, are two other supplementary ones, placed at the back of the foot.

Another point to be observed is that, properly speaking, Ruminants have no incisors or canines in the upper jaw, but merely a hard pad, against which the lower incisors work. The upper jaw, therefore, has only 6 molars on each side; the lower jaw has 8 teeth in front, consisting (according to Owen) of 6 incisors and 2 canines, and 6 molars on each side. The first set of incisors is very small, and are pushed aside by the second and larger set; this is well seen in the specimen of the front portion of the lower jaw of a Cow.

The horns of Ruminants are hollow and horny, fitting on to solid bony projections of the skull, called "horn-cores." The so-called "horns" of the Deer are solid, and are therefore not true horns; their proper name is "Antlers."

Representatives of four of the numerous families of Ruminants are exhibited.

The CAMELIDÆ are all large animals, one of the smallest being the Alpaca. Strictly speaking, it has four small incisors and two small canines in the upper jaw, but they are not visible in the specimen exhibited. They also have only two toes, without any subsidiary ones, and these, in the Alpaca, are only protected on the upper surface by horny nail-like hoofs, the animal walking upon the back part of its toes, which is covered with a hard horny pad. It has only three stomachs, the manyplies not being developed. The upper lip is partially cleft, and horns are never present.

The TRAGULIDÆ, represented by the skeleton of the Stanley Musk-Deer, were formerly included with the Musk-Deers, but the latter have now been proved to be true Deers, and hence the family is now known by the English name of Chevrotians. They are remarkable for having canines in both jaws, those of the upper jaw being in the form of tusks, larger in the males than the females. The third stomach (the psalterium) is wanting; and the Cannon-bone is only formed late in life, if formed at all. Horns are never developed; there seems to be a curious "correlation" between horns and canine teeth; the two are very rarely present in the same animal.

The CERVIDÆ are mainly distinguished by their antlers, which, as has been observed, are solid, and shed annually, and except in the Reindeer are found only on the males. When newly grown they are covered with a very sensitive hairy skin, or "Velvet," as it is usually called (see the specimen of the Reindeer's head, hanging from the Gallery at the end of the room); after a time the vessels of this skin are obliterated, and the skin dies and peels off. The main stem of an antler is called the "beam," and the branches the "tynes;" in some species an additional tyne is produced every succeeding year, till the antlers become of an enormous size. No Deer are found in Australia, and only one (the Barbary Deer) in Africa, their place being there taken by the Antelopes.

The CAVICORNIA have true horns (*i.e.* a horny sheath surrounding a bony core), and are never shed. They are particularly abundant in Africa, and along the gallery may be seen specimens of different species from that country. There are three families of Cavicornia, the Antelopes, the Oxen, and the Sheep. In all of them the true Ruminant dentition is met with, and the horns are not exclusively confined to the males.

PERISSODACTYLA or Odd-toed Ungulates. Of this section only three families exist at the present day, those of the Rhinoceros, the Tapir, and the Horse. The principal characteristics common to all being a simple stomach (*i.e.* not divided into compartments), and horns, if developed, not with bony cores or in pairs.

The horns of the Two-horned Rhinoceros give a very good idea of the structure of the horns of this family. They appear to be made up of a mass of hairs agglutinated together, and moreover, like hairs, can be removed from the skin without cutting it, as may be noticed in the smaller of the two horns in the specimen, where it may also be noticed that though there are two horns, they are not in pairs, but one behind the other. Rhinoceroses generally have no canines, and in the Two-horned Species there are no incisors when the animal is full grown.

The Tapirs are distinguished by their short moveable proboscis or trunk, with the nasal apertures at the extremity, as in the Elephant. The fore-feet have four toes each, but the toes are not symmetrical, the little toe not reaching to the ground; the hind feet have three toes each. The toe-nails of one foot are exhibited, giving some idea of the size of the foot. The skull is very similar in shape to that of the Pig.

Horses walk only on the tip of the third toe, which is protected by a thick hoof. The 2nd and 4th toes are rudimentary, and can be seen in the bones of the foot of the Pony; these are called "splint-bones." The teeth are peculiar, being recognised at once by the great length of the tooth before the fangs divide, as may be seen in the skull of the pony, where the front

part of the jaw has been removed. Canines are present, but only in the male. The incisors are very peculiar. In the skull of the young horse, where the animal was shedding its first teeth, the fangs of the latter are seen to be almost entirely absorbed from the pressure of the second set, and the true form of these second teeth can be seen, though they have not grown beyond the jaw. There is a hollow in the top of the tooth, just as if the enamel were the finger of a glove and the upper half had been drawn down inside the lower half; this hollow is filled with soft cement, and fragments of food, giving a discoloured spot in the middle of the tooth; as the front teeth are worn down, this "mark," as it is called, becomes gradually smaller and smaller till it vanishes, the tooth being then worn down past the bottom of the fold of enamel, and thus the age of the horse can be told very accurately by those accustomed to examine horses' mouths. The small portion of the jaw of a Horse, showing the structure of the interior, is very instructive; the cross "fibres" of bony matter give wonderful strength to the jaw; the specimen also exhibits the manner in which all bones are formed, no bone being perfectly solid, even the strongest being composed of two "tables" of solid bone filled up with bony matter in the shape of sponge.

The two next orders, SIRENIA and CETACEA, are often united into one, under the name Mutilata, from the entire absence of hind limbs, their place being taken by a powerful tail fin, differing essentially from that of a fish by its being horizontal instead of vertical, and having no bony rays—in fact it is but an expansion of the skin. The two orders agree also in having the fore limbs converted into swimming paddles or "flippers," a well-developed snout, and no external ears.

They differ in the position of the nostrils, which in the Sirenia are placed on the upper surface of the snout, whilst in Cetacea they are on the top of the head. Whales also have a disproportionately large head, and the skin, when full grown, entirely without hair or bristles.

Cetacea include the Whales, Dolphins, and Porpoises. The "Whalebone" or Greenland Whale is an enormous animal, from forty to sixty feet in length, and instead of teeth it has a series of plates of whalebone hanging down from the roof of its mouth. These plates of whalebone (of which a specimen is fastened against one of the pillars) hang down from the roof of the mouth in two rows, often as many as one hundred in each row, and are furnished on their inner edge with a thick fringe of fibres of whalebone. The gullet of the Whale is too small to admit any but the very small sea animals, and consequently when it wants to feed it gulps in a quantity of water and forces it out again through the sieve formed by this fringe, which strains out all the animals, and the Whale is therefore enabled to procure a sufficient supply of these small animals. Though the Whalebone Whale has no teeth when born, it has some before birth, though they never cut the gum.

The Sperm Whale or Cachalot is a much larger animal, from fifty to seventy feet in length, and has about fifty-four teeth in its lower jaw, those of the upper jaw never passing beyond the gum; specimens of these teeth are exhibited.

The fossil Vertebra of a Whale from the white Crag is worth noting. The Dolphin, as may be judged from the skull, has an elongated snout and numerous conical teeth in each jaw. It is common in all European seas and is especially abundant in the Mediterranean.

The Porpoise, of which a specimen may be seen on the top of Case 5, is the smallest and commonest of all the Cetacea, rarely exceeding four feet in length. It frequents the Atlantic, Pacific, and Arctic Oceans, as well as the Mediterranean.

The SIRENIA are represented at the present day by the Dugongs and Manatees, often called Sea Cows. The former inhabit the mouths of rivers on the East coast of North America, the Gulf of Mexico, and the West coast of Africa; the latter the coast of the Indian Ocean and its Islands, as far as the North Coast of Australia. The molar teeth are peculiar, and especially numerous in the Manatee, but they are never all in use at the same time. The peculiar manner in which both upper and lower jaws of the Dugongs are bent downwards in front is worth notice. The bones are peculiarly dense, their texture being nearly as close as ivory.

The next Order, the EDENTATA, are not properly named, as with the exception of two genera, they all have teeth of some kind, but differing from those of higher animals; and hence the term BRUTA is a better one for them. The teeth have no true enamel, they are never displaced by a second set, and they have no complete roots. The middle incisors and the canines are invariably absent.

The Sloths are peculiarly South American, and their usual habit of hanging from the branches of trees is well shown in the specimen of the Two-toed Sloth. They are by no means sluggish when in that position, and the name was given to them before their habits were known; the long claws naturally bend inwards, so that the animal sleeps in the position indicated. The stomach is "complex," approaching to that of Ruminants, and the neck is very peculiar. Mammals have seven vertebrae in the neck, whether it be long or short, the only exceptions to this rule being found in the Sloths, the Three-toed Sloth having more than seven and the Two-toed Sloth less.

The Armadillos are all South American; they have strong claws and collar-bones, and burrow in the ground, they live upon a variety of things, insects, worms, carrion, roots, and fruits. The coat of mail of bony plates is generally so arranged that they can roll themselves into a ball like a Hedgehog, but this is not always the case.

We now come to those animals which seem to connect Mammals with Birds. Though the young are brought forth alive, and so far differ from Birds, yet the young are most imperfectly formed and as soon as they are born are transferred to a pouch or "Marsupium." Even then they are unable to feed themselves, and the female has special muscles by which to force the milk down the throat of the young, and the young has the windpipe specially prolonged so as to allow the milk to pass by it and thus prevent choking.

With the exception of one Genus (which is American) they are all found in Australia, Van Dieman's Land, New Guinea, and some of the neighbouring Islands, of which they form almost the exclusive possessors in the Mammalian line, and hence, though forming an extremely naturally order, sharply separated from all the rest of the Mammalia, they form a large and varied group; some being herbivorous others insectivorous and others again carnivorous.

There are two primary divisions (I) those which have two incisors in the lower jaw, and (II) those which have more than two. To the former belongs the Great Kangaroo, of which the skull and feet are exhibited. The fore-paws are small, with five fingers, but the hind feet have only four toes, one of which is greatly developed, and with it the animal is able to inflict very severe wounds. Its usual habit is to catch hold of its foe with its fore-paws and then to tear it open with its hind ones.

The *Monotremes* are still more Bird-like in their internal structure. There are only two families, embracing five species.

The *Ornithorhynchus* or Duck-bill has its jaws largely developed, with the edges sheathed with horn, and the teeth are represented by two horny ridges on each side of each jaw; the toes are all webbed, and though the web projects beyond the extremities of the toes it can be folded back, so as to allow of the nails being used for the purpose of burrowing, which it does extensively in the banks of rivers, being very aquatic in its mode of life. It is clothed with a very dense fur, and some of the hairs are flattened, giving a glistening appearance to the coat. The "bill" is pale pink when alive, and very rarely does a stuffed specimen give a correct idea of the animal. Its food consists exclusively of insects.

The female has neither pouch nor nipples and it is still unknown how the young is nourished, but it is certain that when born there is no "bill;" the mandibles are soft and flexible, and the tongue is not placed so far back in the mouth as in the adult; it is also totally hairless and the eye is at first covered with a skin.

The *Echidna*, of which there are four species, is a very different looking animal; it has absolutely no teeth or representatives of teeth, but the jaws are long and narrow, and covered with a skin except at the extreme tip, where

an aperture is left for the extrusion of a long glutinous tongue. The toes are not webbed, and each toe is furnished with a very strong claw; it is covered with strong spines interspersed with a general coating of bristly hairs. It is perhaps the strongest animal of its size in existence, and can burrow through the hardest ground with great rapidity. The female is said to have a marsupium, small, but large enough to hold the young.

AVES OR BIRDS.

Without entering into many details of the structure of Birds, a few of the more important characteristics may be pointed out.

The *Feathers* are good non-conductors of heat, and this is necessary for preserving the high temperature of their bodies, which is especially characteristic of Birds, and for enabling them to sustain the rapid changes of temperature to which some are subject as they rise to great heights in the air and then swoop down again to the earth. They are formed of a Quill, a Shaft, and the Webs; these latter are composed of Barbs and Barbules. The barbules are hooked at the end and an ordinary feather has the barbs all connected together by these hooks, and thus a firm surface is obtained for offering a resistance to the air as the bird strikes it with its wings. Near the base of the shaft the barbules have no hooks and thus the barbs form the "down." In those birds which do not fly, as the Ostrich and Emeu, the barbules also have no hooks and the feathers lie quite loosely and sometimes have even the appearance of hairs.

The *Wings* are strict modifications of the fore-limbs of Mammals. There is the arm bone attached to the shoulder, then the two bones of the fore-arm (united together at each end), then the wrist consisting of two small bones. From the wrist proceed a small thumb and two fingers, the latter united together except at the last joint, where they divide, one of the bones being much smaller than the other. The thumb carries a tuft of feathers, which is called the "bastard wing."

The *Breastbone* is very large, and furnished with a keel, varying in depth according to the powers of flight of the bird. In birds of passage this keel is very large, as well as in Humming-birds, which spend the greater part of their life flying about with great rapidity, whilst in the Ostrich and Emeu, which have only very rudimentary wings and so cannot fly, the keel is absent.

The *Vertebrae* of the neck are more numerous than in Mammals and are variable in number; those of the back are more or less immovably connected together in those birds which can fly, in order to give a base of resistance to the wings.

The *Bill* is sheathed with horn, which in some species is serrated along the edge, and this is the nearest approach to teeth to be found in living species ; a few fossil forms have properly developed teeth.

No wild bird has more than 4 toes, but some domesticated species have a fifth.

Birds, as in the case of Mammals, are classified according to the structure of their beaks and feet. There are 7 Orders, divided into several families, though the number of these families is continually increasing as the individuals become better known.

(I). *Raptores*, or Birds of prey. These are divided into two sections, the *Diurnal* and the *Nocturnal*. Specimens of these are seen in the Cases on the other side of the room. The position of the eyes and the texture of the plumage are the chief points to be observed ; in the former the eyes are placed at the side of the head and the plumage lies close to the body, in the latter the eyes point forwards and the plumage is very soft, rendering the passage through the air as silent as possible. The ring of horny plates round the eyes of the Owls (well seen in the skeleton of the Eagle Owl) is also worth notice. In this Order the female is larger than the Male.

(II). *Insectores*, or *Perching Birds*. By far the most extensive Order of Birds, their general characteristics, according to Owen, being "Legs slender and short, with 3 toes before and one behind, the two external toes being united by a very short membrane. The slender feet are of considerable use in forming the beautiful nests, so characteristic of this Order. The Order is divided into 4 sub-orders.

(a) *Conirostres*. These have a strong beak, broad at the base and rapidly tapering to the tip, most strongly marked in the Hawfinch and its allies. The Case in the centre of the opposite wall contains several examples of birds of this Order, which also include the Larks and Hornbills, these latter being the largest of the Order, some of them being as large as a Goose ; but the conirostral beak is marked by its great size and by the appendage, like a helmet, to the upper mandible ; large as the bill is, it is extremely light, the interior being formed of a mass of air-cells. The Birds of Paradise and Bower-birds also belong to this sub-order ; the former are among the most beautiful of all birds, and the latter have the curious habit of making long Bowers, which they adorn with bright shells, feathers, white bones, &c. A specimen of one of these "runs," as they are called, is exhibited, but without the ornamentation.

(b) *Dentirostres*. So called from the upper mandible being provided with a distinct notch in its lower margin near the tip. The Shrikes, Fly-catchers, Thrushes, Tits, and Warblers belong to this sub-order.

(c) *Tenuirostres*. These have a long and slender beak with long and slender toes, especially the hind-toe. The Creepers, Humming birds, Hoopoes, Nuthatches and Wrens belong to this sub-order.

(d) *Fissirostres*. Most of these birds live on insects and take their prey on the wing; they have a mouth with a remarkably wide gape, the opening protected by a number of bristles. The Swallows, Swifts, Goatsuckers, Kingfishers and Beo-eaters belong to this sub-order. The "edible birds' nests" are made of the saliva of a kind of Swift. Even in England we meet with some nests, as for instance those of the Song Thrush and Swallows, of which the bird's saliva forms a not inconsiderable portion. The most remarkable of the Kingfishers is the Laughing Jackass of Australia; so called from its song, which resembles a prolonged hysterical laugh.

(III). *Scansores*, or Climbers. The only specially distinctive character of these birds is that of having two toes directed forwards and two backwards, by which they are enabled to climb with unusual facility, though their flight is rather slow and heavy. The Order contains a very miscellaneous lot of families, the Cuckoo, Woodpeckers, Wrynecks, Parrots, Toucans, and Trogons being some of them. Cuckoos are now believed to have the power of laying eggs similar in colour to those of the birds in whose nest it intends to deposit them. After laying the egg on the ground it carries it in its bill and drops it into the nest during the absence of its owner, and the reason why Cuckoo's eggs are so often found of a colour different from the others in the same nest, is because the Cuckoo, from some cause or other, was prevented from depositing its egg in the nest intended for it, and so had to put it in the first suitable nest it came to. Whether the same bird can lay eggs of different colours, or not, is still a question. Cuckoo's eggs are recognised by the grain of the shell rather than by the colour. Woodpeckers are interesting for the great length of their tongue, of which a specimen is exhibited, and also for the stiff tips to the tail feathers, by which they are greatly aided in climbing the trunks of trees.

Of the Parrots the most interesting feature is perhaps the upper mandible; in most birds this is so firmly ossified to the skull that it appears to form one piece with it, but this is not the case in its early stage, for it is then only united to the skull by cartilage, and in the parrot tribe this cartilage retains its flexibility, so that the upper mandible really has a considerable degree of mobility. The most extraordinary individual of this tribe is the Owl Parrot of New Zealand. Contrary to the usual habits of Parrots, this animal is not gregarious, and is only active by night in forming burrows in which it spends the day. Two species of Parrots have become extinct in recent times, one as recently as 1851. The Toucans, like the

Hornbills, have enormous bills, but being filled with air cells are wonderfully light.

IV. *Rasores*, or *Scratchers*, often called *Gallinæ*. The Order generally is known by the convex upper mandible, having the nostrils pierced in a membranous space at its base, and the nostrils covered by a cartilaginous scale. The typical bird has also strong thick legs, covered some way down with feathers, and the toes armed with strong blunt claws, suitable for scratching; it has also three toes in front and one behind, this latter being short and placed higher up the leg, so that it only just touches the ground. The young are "precocious," i.e., able to run about and provide themselves with food as soon as they come from the egg.

The *Doves* are included in this Order, and form a second sub-order. Their legs are far more slender; the hind toe is on a level with the others, their powers of flight are better, and the young on first coming from the egg are comparatively helpless. From the sounds which they utter the two sub-orders are sometimes called *Clamatores* and *Gemitores*.

To the *Gallinacei* or *Clamatores* belong the *Grouse*, *Partridge*, *Pheasant*, *Quail*, and *Peacock*. Very few of these are natives, though in some few cases they have become thoroughly naturalised.

To the *Columbaei*, or *Gemitores*, belong the *Doves*, and the *Dodo*. All Tame *Doves*, however much they may differ in shape or plumage, are believed to have been derived from the *Rock Pigeon*, which occurs wild in many parts of Europe. The *Dodo* formerly inhabited the Island of *Mauritius* in great numbers, but the last record of its occurrence dates from the year 1681. It was a large heavy bird, larger than a *Swan*, and entirely unlike an ordinary *Pigeon*, as may be judged from the cast of its head. It has been so effectually destroyed that not a single perfect specimen exists; a few old but apparently faithful oil-paintings of it, with a good number of bones, are all that remain to tell its history. A second species, something like the *Dodo*, the *Solitaire*, of the Island of *Rodriguez*, about 300 miles to the east of *Mauritius*, was exterminated about the year 1693.

(V). The *Grallatores* or *Waders* inhabit the shores of estuaries, marshes, banks of rivers, and such like places, and are distinguished by the great length of leg, the greater part destitute of feathers, and rather long toes, never completely webbed, though sometimes partially so. The hinder toe is sometimes wanting. They are divided into four families,

(a) *Macrodyteli*, with four toes, long and sometimes lobed at the sides, and wings rather small. *Rails*, *Moor-hens* and *Coots* belong to this family.

(b) *Culirostres*. The bill is long, the legs also long, and the toes usually to some degree connected by membrane. *Cranes*, *Herons*, *Bitterns*, *Spoonbills*, &c., represent this family, the most typical of the order.

(c) *Longirostres*, as the name indicates, have long slender, soft bills. The legs are of various length, and the hind toe is short and sometimes absent. "The bill in these Birds serves as an organ of touch, being used as a kind of probe to feel for food in mud or marshy soil." To fulfil this purpose, the tip of the bill is furnished with numerous nerve filaments. They feed mostly on insects and worms. Woodcock, Sandpipers, Snipe, Godwits, &c., represent this family.

(d) *Pressirostres*. These are characterised by a moderately long bill (seldom longer than the head) with a compressed tip; the legs are long, but the toes short and almost always connected together at their base by membrane; the hind toe short and often wanting; the wings long, so that they can both run and fly with considerable swiftness. The Plovers, Lapwings, Longhanks, and Oyster-catcher represent one division of this family, the Bustards, very different in appearance, the other.

(VI). *Natatores*, or Swimmers. For this purpose the body is boat-shaped and the legs are placed very far back, so that they form excellent paddles, but cause the animal to waddle when on the ground; the feet are more or less perfectly webbed, and the body is covered with a very dense down to protect it from the cooling effect of the water; the young are precocious. The four sub-orders into which this order is divided are—

(a). *Brevipennatae*. Wings always short and sometimes rudimentary and without quill feathers; legs placed very far back. The Penguin, Grebes, Guillemots, and Divers belong to this sub-order. The Puffin has occurred three times near Marlborough.

(b). *Longipennatae*. Wings long and pointed and bill hooked. The Gulls and Terns form one group, and the Petrels and Albatross another.

(c). *Toti-palmatae*. This sub-order is well marked by the hind toe being directed inwards and united to the other toes by membrane. The Cormorant, Shag, Gannet, and Frigate bird belong to this sub-order.

(d). *Lamellirostres*, which, as the name indicates, have a series of plates or lamellae round the edge of the bill, forming a kind of fringe for straining the mud from their food. The bill is also very sensitive. Ducks and Geese form very good examples of this sub-order.

(VII). *Cursores* or Runners, sometimes called *Ratitae*. The wings are rudimentary, and consequently there is no keel to the breast-bone, and consequently, as the bird cannot fly it has a compensating strength and thickness in the leg, a skeleton of one of these birds showing great thickness of leg surmounted by a diminutive head, seemingly out of all proportion. The barbules have no hooks, and the plumage presents a very different appearance to that of birds in general.

The Ostrich has only two toes, the inner one much the larger and clawed. The eggs average three pounds in weight and are the largest among existing kinds of bird; they show plainly the pores of the shell, by which during incubation air is admitted for the respiration of the developing chick. They are hatched partly by the sun, and partly by the exertions of both parents relieving each other, though Mr. Selater states that the duty of incubation is entirely taken by the males, as in the case of the Emeu.

REPTILIA.

Strange as it may seem, Reptiles are more nearly related to Birds than to any other animals, but as the points of resemblance are more internal than external, it will be impossible to describe them here. They are divided into ten orders, of which the six first are fossil, and have no representatives in the Museum at present. The other four orders are Crocodilia, Lacertilia, Ophidia, and Chelonia.

CROCODILIA, embracing the Crocodiles and Alligators, are recognised at once by being covered with horny scales outside and a number of small bony plates inside the skin; these plates being so arranged in definite groups and lines as to afford distinguishing marks for determining the different species. The teeth are ranged in a single row round the jaws, in distinct sockets, not in a long groove. They are conical with the fang hollowed out to receive a second tooth and that again to receive a third, each succeeding tooth being ultimately larger than the preceding one. The animal tears and snaps at its prey a good deal, and the loss of teeth is often very considerable, so that this continued succession of teeth is very necessary. The fourth tooth on each side is larger than the others, and is generally called a canine tooth, and in true Crocodiles a piece is cut out of the upper jaw for its reception, and the tooth can be distinctly seen when the mouth is shut: in Alligators, however, the lower canines are received into a hole in the upper jaw, and are therefore concealed when the mouth is closed; this forms one of the main distinctions between the two families. The pits in the upper jaw for the reception of the teeth of the lower jaw are occasionally perforations, the tips of the lower teeth actually passing through the upper jaw, as may be seen in the specimens exhibited. The Vertebrae of the back have the main part, or "body" as it is called, rounded behind and concave in front; those of the neck have small ribs attached to them, and this makes it very difficult for the animal to turn, a circumstance which renders it easy to escape from a Crocodile on land. There are also some "false ribs" over the stomach. There are five toes on the fore limbs and four on the hind ones, all more or less webbed; three only of the toes on each

foot have claws. The eye is protected by three eyelids, the tongue is large and fleshy, but fastened to the bottom of the mouth, and both ears and nostril are protected by valves.

The two branches of the lower jaw project backwards so far, that they actually pass beyond the rest of the skull, and when the creature opens its mouth, it seems as if it were lifting up its upper jaw and not lowering its lower jaw, this has given rise to the idea that the Crocodile, unlike other animals, moves its upper jaw and not its lower.

The Crocodile, on catching its prey, drowns it, and, if small enough, swallows it then and there, for it is evident that it cannot masticate its food; but if the prey is too large to be swallowed at once, the animal hides it under some bank beneath the surface of the water, and when sufficiently decomposed to fall to pieces, the Crocodile devours it. It will be observed, on looking at the head of a Crocodile, that the tip of the snout and the eyes are situated above the general surface of the head. The animal has also a flap of skin hanging down from the top of its mouth, just in front of the gullet, which it is able to press against the tongue and thus effectually prevent any water going down the throat even when the mouth is held open under water. The air, on entering the nostrils, passes along inside the head direct to the wind-pipe, without entering the mouth, and as the animal is able to breathe with its mouth open, it is evident that it can hold its prey under water without much inconvenience to itself, as it has merely to put the tip of its snout above water if it wants a fresh supply of air. So too when watching for its prey it can lie under water with only its nostrils and eyes just above the surface.

Besides the Crocodiles and the Alligators, there is a third family of living Crocodilia, the Gavials, known at once by the long slender snout. The commonest is the Gavial of the Ganges. It lives mostly in water feeding on fish, and is very rarely seen on land.

LACERTILIA or Lizards. A typical Lizard is very like a Crocodile in shape, and has the horny scales but not the bony plates; the teeth also are lodged in a long groove running round the mouth, not in separate sockets; but though the proper number of limbs is four, some few have only two and some none at all visible. In this case they resemble snakes, from which they may be distinguished by having eyelids and also by not having the lower jaw expansible; and if a skeleton can be seen, rudiments of collar bone and shoulder blade will be detected.

They are divided into three groups according to the structure of the tongue, which may be either (a) long and forked, as in snakes, or (b) thick and fleshy and not protrusible, or (c) long and protrusible and clubbed at the end.

Among the more important families, of which there are representatives, in the Museum are :—

(1). *Geckotidæ*. The tongue is wide, flat, and hardly protrusible, eyes large, eyelids short; teeth numerous, but small; and the toes furnished with plates or adhesive discs, with which the animal can run on the smoothest surface and even back downwards.

(2). *Agamidæ*. Body scaly, tongue thick and not protrusible; eyelid present, and teeth implanted on the edge of the bones of the jaw. The most interesting species of this family is the Flying Dragon (*Draco volans*) of the East Indies and Indian Archipelago. The membrane on each side is supported by the last five or six ribs, which are greatly lengthened and project out straight from the back-bone, but when not in use can be folded along the sides; it only acts as a parachute, the animal having no real powers of flight.

(3). *Iguanidæ*. These belong almost entirely to the New World, as the *Agamidæ* to the Old. The structure of the tongue is the same in both families. There is generally a crest along the back, a pouch to the throat, and the body is covered with overlapping scales. The Common Iguana is sometimes five feet long.

(4). *Varanidæ* or Monitors. The head and abdomen are covered with small non-overlapping scales and the tongue is long and like that of snakes. Some species are six and even eight feet long.

(5). *Lacertidæ*, or true Lizards, to which belong the two common English kinds, the Sand-lizard (*Lacerta agilis*) and the Viviparous Lizard (*Zootoca vivipara*).

(6). *Amphisbenidæ*. Snake-like animals with the limbs uniformly absent (except in one Mexican Genus). To this belongs the Slow-worm or Blind-worm (*Anguis fragilis*), found over almost the whole of Europe, Western Asia and Northern Africa.

OPHIDIA or Serpents have no limbs at all or very rudimentary hind ones, and a very large number of ribs (as many as 300 pairs in some species) on the tips of which they may be said to walk. They can progress very rapidly, partly on account of the Vertebrae being joined together by ball-and-socket joints, so that the body has great flexibility, and partly on account of the body being clothed with scales. The epidermis or outer skin is thin and translucent, and cast off and renewed periodically. In the dermis or inner skin are developed numerous flat scales, overlapping one another, or they may be tubercular and not overlapping; these scales are larger on the head and under part of the body. The epidermis covers the whole body, even the eyes, and for a few days after changing its skin the Snake is blind. The tongue consists of two muscular cylinders, united at the base, but free at the

extremities; it is in constant vibration when protruded, and seems to be an organ of touch rather than of taste. The most interesting part of a Snake is the mouth. The lower jaw is not only divided into two halves, connected in front by muscles, but each half is made up of several pieces, also united together by muscles and ligaments. The lower jaw again is not attached directly to the skull as in Mammals, but between it and the skull is a bone called the quadrate bone, so that the lower jaw works on this quadrate bone, and that again on the skull. In Birds this is quite a small bone of rather a square shape, hence its name, but in Serpents it is of some considerable length. This quadrate bone is attached to one of the bones of the skull (the squamosal), which is also moveable, consequently the lower jaw can not only be opened wide by the muscles joining its two halves, but can also be lengthened by extending the muscles connecting each of its parts, and still more opened by the muscles connecting the jaw with the quadrate bone, and those connecting the quadrate bone with the squamosal, and those again connecting the squamosal with the rest of the skull. A snake is therefore capable of performing the most astonishing feats in the way of swallowing. The upper and lower jaws are furnished on each side with a row of teeth pointing towards the throat, and the palate has also two rows of teeth; all these teeth fasten directly to the skull, not to the skin or sunk into sockets, and are only useful for holding the prey, not for mastication. But though the Snake can seize and hold its prey, a special provision must be made for enabling it to get the food down its throat, as it is entirely destitute of limbs; each side of the lower jaw can move independently by itself, consequently when the prey has been seized, the Snake pushes forward the right side, and when it has got a firm hold, then the left side, and thus by alternate movements of the branches of the lower jaw it can force the food down its throat.

In Venomous Snakes the teeth of the upper jaw are replaced by two "fangs," capable of being raised or depressed at will. Each fang has a tube opening near the tip at one end, and communicating at the other with a poison-gland, situated beneath the eye; when the animal strikes its prey the poison fangs are erected, the poison-gland compressed, and the poison forced through the tube into the wound.

Snakes are divided into several Families, according to the structure of their teeth; but it will be sufficient here to point out the general difference between venomous and harmless Snakes, the *Viperina* and *Colubrina*, to which our two common Snakes belong. The *Viperina* have the head triangular, broadest behind, and covered with small plates, and the neck very distinct; in *Colubrina* the head is not markedly triangular, but tapers off gradually into the neck, and is covered with large plates. In the case of

our English species a more evident distinction is in the markings on the body, the Viper having a series of large dark blotches along the back, connected together so as to look like a chain; the Grass-snake, as the harmless species is called, has only some small spots scattered over the back, and not joined together

CHELONIA, or Turtles and Tortoises. These animals appear to have their hard parts outside, and thus to form an exception of the rule laid down when talking about Vertebrates generally, and it will be necessary therefore to enter rather fully into the structure of these hard parts. The skin of animals is divided into two very distinct portions, an outer skin, or epidermis, and an inner skin, or dermis. If the epidermis, or any of its appendages, becomes hard it assumes a horny nature, thus hairs and nails being parts of the epidermis are horny. On the other hand if the dermis becomes hard it becomes bony, and such are the teeth and the bony "scutes" in the skin of of the Crocodile or Sturgeon. The upper part of the "shell" of a Turtle is called the "Carapace," the under part the "Plastron." The Carapace is covered with a horny skin, not in one piece, but in definite plates or "scutes." There are five forming a row down the centre of the back, roughly hexagonal in shape, then a row of four plates on each side of the central one, and finally a row of much smaller plates running all round the Carapace. This skin is the hardened epidermis, and on removing it the next layer will be observed to be bony, and divided in a similar manner to the plates of the outer layer, only into about double the number of pieces. Thus there are ten in the middle row, eight in each of the side rows and also the marginal series. On looking at the inside of the Carapace, it will be easily seen that the central row of plates corresponds to the vertebræ and the side rows to the ribs, but if we take a cross section so as to see the layers of bone, we shall see that the lower half of a plate is a rib and the upper half a separate bone, which is therefore the ossified dermis. A similar structure will be observed when the plastron is examined, only in this case there is considerable doubt as to what the various parts really represent; but we may state generally that the "shell" of Turtles is made up of (1) the vertebræ and much-flattened ribs, fastened together by (2) an ossified layer of dermis, the whole covered by (3) the horny epidermis.

Such is the structure of a typical Carapace and Plastron, but in Mud-tortoises (*Trionyx*) the plates of the Carapace are much less developed and only connected with those of the plastron by soft horny structures.

Another most important and distinctive character of Chelonians is the structure of the jaws. In the young state the lower jaw is composed of several pieces, but they become completely united with age, as well as almost

all the other bones of the skull, so that it ultimately consists of two pieces, the cranium and the lower jaw. The jaws are entirely toothless, the edges being simply sheathed with horn, constituting a sharp beak.

In consequence of the immobility of the ribs, Turtles cannot breathe in the usual way, but have to *swallow* the air.

Chelonians are divided into three sections :—

(I). *Chelonidae*, or Turtles. Aquatic animals, with the limbs converted into excellent swimming paddles. The "Tortoise-shell" of commerce consists of the epidermic plates of the Hawk's-bill Turtle (*Chelone imbricata*).

(II). *Trionycidae*, Mud-Turtles or Soft Tortoises. The development of the carapace in these animals is imperfect and it is covered with a smooth leathery skin; the lips are also fleshy. They inhabit fresh water and are carnivorous.

(III). *Testudines*, or Land Tortoises, which, though able to swim, are strictly land animals and vegetable feeders. The most familiar species is the *Testudo Graea*, indigenous to Spain, Italy, and Greece. A couple of eggs of this species, laid in England, are exhibited.

AMPHIBIA.

With the exception of the Labyrinthodontia (which are extinct) and the Ophiomorpha, consisting of a few animals very similar to large Earth-worms, this Class consists of only two Orders, very distinct, yet clearly related to one another, viz., the *Anoura*, or Tail-less, and the *Urodela*, or Tailed Amphibians. They resemble Fish in having gills at least at some time of their life, but, unlike fish, they always have lungs when full grown; these gills always disappear in the *Anoura*, but may or may not do so in the *Urodela*.

The *ANOURA*, comprising the Frogs and Toads, are all very similar in appearance, far more so than can be found in any other Order of animals; they always come from eggs, and when first hatched almost invariably appear as Tadpoles. These Tadpoles have two sets of gills, one external, which is very soon lost, and an internal set, which is retained for a longer or shorter period. As long as these gills remain there is a "gill-opening" to allow a means of egress to the water, but when the lungs are developed and the gills absorbed, the gill openings are closed. The hind legs are first developed, next the fore-legs, and then the tail is gradually absorbed till it entirely vanishes. The eggs are laid in water, those of the Frog in masses; when first laid they are little dark round bodies enclosed in small gelatinous envelopes, which quickly swell in the water till they present the well-known appearance of "Frogs' spawn." The most remarkable exception to this rule is that of the Surinam Toad (*Pipa americana*)

in which "the skin of the female's back at the laying season thickens greatly and becomes of quite a soft and loose texture. The male, as soon as the eggs are laid, takes them and imbeds them in this thick soft skin, which closes over them. Each egg then undergoes its process of development so enclosed, and the Tadpole stage is in this animal passed within the egg, so that the young Toads emerge from the dorsal cells of the mother completely developed miniatures of the adult; as many as 120 of these dorsal cells have been counted on the back of a single individual." (*Mivart*).

Another interesting species is the American Tree-frog (*Nototrema marsupiatum*). This animal "has a pouch extending over the whole of the back and opening posteriorly. Into this the eggs are introduced for shelter and protection." Other singular methods of preserving the eggs occur in other species, but the animals in which they occur are not yet represented in the Museum.

But though gills are replaced by lungs in the adult, it is interesting to note that the skin of the Frog is so necessary for respiration that the lungs could not do without it, but on the other hand a Frog has been kept forty days alive after the lungs have been cut out, and for two months in a cage immersed under water. It may therefore be supposed that perspiration is very profuse; a Frog tied up in the full force of the summer sun speedily dies, it is in fact dried up.

The tongue is large and fleshy, and attached to the front of the lower jaw with the point directed towards the throat. This it darts out with considerable rapidity when wishing to catch an insect, but unless the animal moves it will not touch it. It will even jump up into the air and catch a fly on the wing with its tongue.

The mouth is very large, and, when opened, two small holes may be observed in the roof of it; these are the openings of the nostrils. Frogs have a row of minute teeth in the upper jaw, as well as two little groups of teeth between the openings of the nostrils; Toads have no teeth at all in the jaws.

The hind legs are long, and the hind feet especially so. An examination of the skeleton will show that the hind foot is made up of a very long ankle and still longer toes. When the hind limb is turned forward, the knee reaches nearly to the arm-pit; the ankle-joint is about on a line with the end of the snout, and both parts of the foot are beyond it.

It will also be seen that a Frog has no ribs, and consequently is obliged to swallow air when it breathes, as in the case of Turtles. The Frog Tribe has also the fewest vertebrae in its backbone of any Vertebrate animal, generally having only nine, and the Surinam Toad having only seven. The other interesting peculiarities of the structure of the Frog must be omitted, as some small knowledge of Anatomy is required. In addition to the peculiarity

of the teeth mentioned above, Toads may be distinguished from Frogs by their warty skin, shorter legs, smaller webs to the toes, and more swollen shape.

The URODELA might also be considered as animals of the preceding Order, whose development had been arrested at some period, varying according to the species, and thus the varieties of animals in this Order are considerable. Some stop at the development of the limbs, retaining the tail (but the fore limbs are developed first, and then the hind limbs); others always retain the gill-openings, though the gills have been absorbed; others, again, retain their gills though possessing lungs. The two pairs of limbs are generally fairly developed, but in the Siren the hind limbs are always wanting.

The most interesting is, perhaps, the Axolotl, of Mexico. "For some time it was considered to be a large Eft-Tadpole (the English species of this Order are the well-known Efts) till it was found to possess perfect powers of reproducing its kind. Since then, however, it has been found that they have the power of quite altering their appearance, not only losing their gills and closing the gill-openings, but also making great changes with respect to skull, dentition, and other important structures, and all this with extreme rapidity; and what makes it still more curious is, that in this latter state it seems incapable of reproducing its kind, and though the change takes place under the eyes and in the midst of the experiments, no one has been able to detect the conditions of its transformation." (*Mivart*).

The Spotted Salamander (*Salamandra maculosa*) is not uncommon in the Alps; the two or three English species are commonly called Newts or Efts.

PISCES.

Though it is easy to tell an ordinary Fish at first sight, this Class, which is a very large one, is extremely difficult to classify, and every definition has some exceptions. For instance, of the Six Orders into which Fishes are divided, the highest (Dipnoi) was till recently included with the Amphibia, and the lowest (Pharyngobranchii) is so extraordinary that it has been suggested that it should form a separate Class by itself; neither of these are as yet represented in the Museum. It must be understood, therefore, that every rule has its exception, and the characteristics given are only such as are *generally* applicable, and are sure to have exceptions. But before proceeding to classification, it will be necessary to say a few words about certain points.

The *Scales* are developed from the inner skin (or dermis), the outer skin (or epidermis) being represented by the slimy mucus, covering the exterior of the animal. There are four kinds of scales.

(1). *Cycloid*, a circular or oval plate, of a horny or bony consistence, with a more or less even outline.

(2). *Ctenoid*, like the former, only with the posterior margin fringed with spines, or cut into comb-like projections.

(3). *Ganoid*, composed of an inferior layer of bone and a superficial layer of hard polished enamel; they rarely overlap.

(4). *Placoid*, detached bony tubercles, or plates, the latter not uncommonly armed with spines. (See the skin of the Thornback).

In most Fishes there is a line of peculiar scales, called the "lateral line;" each of the scales in this line is perforated by a tube leading down to a longitudinal canal, which runs along each side of the body, and is connected with cavities in the head.

The *Bones* are sometimes cartilaginous throughout life, or may be properly ossified, or again may be only partially so; this character, which might be taken as a very good point for classification, cannot be relied on as any indication of higher or lower development, for the Sharks, which from the very imperfect ossification of the bones, used to be placed low in the scale, have now been placed almost at the top of the Fishes, from their higher development in other points. The bones of the head in the ossified skeletons are very numerous and complicated, whilst in others they form a gelatinous box without any distinct separations, or may be entirely wanting, the Lancelet having no perceptible head at all.

The *Vertebrae*, when ossified, are concave at each end, so that in the animal there is a space between each pair; this space is filled up with a gelatinous substance, and thereby gives great flexibility to the body.

The *Ribs* are very thin and slender, and have nothing to do with the breathing, but are simply embedded in the flesh.

The *Fins* are of two kinds, "paired" and "median." The former, of which there are two pairs, represent the limbs, and are called "pectoral" and "ventral;" each pair being placed symmetrically, one on each side of the body. The latter, as their name indicates, are placed in the median line of the body, and though each is really composed of two fins, they are so completely fastened together that they appear as only one. These *fins* are attached to what are called "inter-spinous bones," which are dagger-shaped bones plunged into the middle line of the body. The median fins are called "dorsal," "caudal," or "anal," according as they are situated on the back, tail, or belly respectively. There may be two or even three dorsal or anal fins. The fins are supported by "rays," which are either *Spinous*, consisting

of a single undivided piece of bone, or *Soft*, composed of several slender spines proceeding from a common base and divided into numerous short pieces. They are invariably found in the caudal fin or tail.

The *Tail* is "vertical," not "horizontal," as in the Whale; it either consists of two equal lobes, when it is called "homocercal," or of two unequal lobes with the back-bone running through the upper lobe, in which case it is called "heterocercal." (See the tail of the Shark).

Respiration is performed by means of *Gills*, comb-like plates on each side of the head, of which there are generally four pairs. The air necessary for purifying the blood is obtained from the water, which is swallowed, and then passed through slits in the throat over the gills and out through the "gill-slit;" the gill slits are protected by "gill-covers," made up of several bones, and which are discernible at once in all our common fishes.

As a very rough approximation to a classification of the Orders, the following may be taken:—

Limbs present	{	Tail heterocercal	{ Scales Cycloid : 1. Dipnoi.
			{ Scales Placoid : 2. Elasmobranchii.
		Tail homocercal...	{ Scales Ganoid : 3. Ganoidei.
			{ Scales Cycloid or Ctenoid : 4. Teleostei
No Limbs	{	Skull present	5. Marsipobranchii.
		No Skull	6. Pharyngobranchii.

(1). **DIPNOI.** Whilst these animals have externally an appearance very similar to that of a fish, their internal structure approximates to that of the Amphibia, and hence, though it has been classed among the fish, it must be placed quite at the top of the scale. It is not represented at present in the Museum.

(2). **ELASMOBRANCHII.** In many points these fish are similar to the Ganoidei, but differ from them in the following particulars:—

Instead of scales or ganoid plates covering the whole body they have numerous detached grains, tubercles, or spines scattered here and there in the skin. In the case of the Rays, these "placoid" scales consist of a disc of bone or cartilage from the upper surface of which springs a sharp spine of dentine. The so-called "shagreen" of the Dog-fishes and Sharks is composed of very small close set tooth-like processes. At other times the placoid structures are developed into defensive spines or "ichthyodorulites," frequently found in a fossil state.

The gills are also very peculiar. The gill-chamber is divided into several small chambers by partitions and each small chamber has two openings, one communicating with the throat and the other with the outside; the gills are fastened to each side of the partitions so as to resemble the leaves of a book; the gill cover is wanting. In the majority of cases there are a series

of alits in place of the gill cover, but in one small section there is only one slit. The other peculiarities are internal.

There are two Sub-orders, (A) *Holocephali*, having the mouth in front and (B), *Plagiosomi*, having the mouth on the under surface of the head. The former is a very small sub-order, but the latter is large and is divided into three sections,

(a). *Cestruphori*, only represented by the Port Jackson Shark and a few allied forms. They have a strong spine in front of each dorsal fin and the back teeth very blunt.

(b). *Selachii*, comprising the Sharks and Dog-fishes. Among other distinctions the most important is that of having the Gill alits on each side of the head and the pectoral fins of their ordinary form and in their ordinary position. The teeth are in the shape of compressed cones, and are in several rows; the jaws are so far flexible that they can be turned out sufficiently to allow of more than one row of teeth being used at once, but, as with the rest of the skull, they are merely a mass of cartilage. Large as the jaws are even when dried, they are reduced to nearly half their size in the process of drying. The embryo possesses external gills but they soon disappear.

The Blue Shark (*Carcharias glaucus*) is so called from the colour of the fins and upper part of the body, though the belly is white. The muscular vitality is said to be as remarkable as that of Reptiles, a body of one swimming about for hours after its head was cut off. It occurs in all tropical and temperate seas, and is usually 6 or 8 feet long, but specimens have been found as much as 14 feet. Its teeth are triangular, with saw-like edges.

The Porbeagle Shark (*Lamna cornubica*) occurs on our own coasts, and is generally about 4 feet long. The teeth are long and narrow, with two "cusps" at the base.

(c). *Batides*, including the Rays and Skates. These have the Gill alits on the under surface of the body and the pectoral fins enormously developed, so as to give a rhomboidal shape to the body. The tail in the Rays is long and slender and generally armed with spines, and the teeth are often flat, forming a kind of pavement.

The *Saw-fish* has not the typical form of the Rays but has the snout enormously prolonged with teeth projecting on each side. These teeth, however, are not real teeth, such as are found in the jaws, but are rather modifications of the scales or tubercles of the skin, which are here implanted and developed so as to closely resemble teeth. From the cartilaginous nature of the skeleton and the peculiar form of the gills the *Elasmobranchii* have considerable affinity with the Lampreys, and for a long time they were therefore put low down in the scale; but when the whole of

their characters is taken into consideration, their brain development, their sight (the eyes being sometimes furnished with a third eyelid), their hearing, their heart and the external gills in the embryo, they must be placed nearly at the top of the class.

(3) *Ganoidei*. This Order is represented by very few living forms, but had an enormous development in past geological epochs. The Vertebræ are very imperfectly ossified, in some cases not at all so, but the head is protected by large plates of bone. The *Polypterus* is remarkable for the dorsal fin, which is broken up into a number of separate portions, each composed of a single spine in front with a soft fin attached to it behind. There are several species, inhabiting the Nile and other African rivers. The Sturgeon has several rows of ganoid plates along the body, though its Vertebral column is never more than cartilaginous. Its swim-bladder is used for Isinglass, and its Roe is sold as Caviare. The number of eggs in a single fish is enormous, a specimen, weighing 273 lbs., had the roe weighing 42 lbs., and in this there were computed to be two million eggs. "Those fish which hibernate in the rivers bury their snouts in the mud, so as to leave the bodies sticking up in the water like the piles of a lake dwelling. Their numbers in many of the Russian rivers are almost incalculable. At Ruibinsk, on the Volga, the fisheries draw together in spring and summer 100,000 people, who work continuously, and disperse to their homes in winter. When the fishing has been intermitted for a day, the Sturgeons have been known to completely fill a river 360 feet wide and 28 feet deep, so that the uppermost fishes appeared with their backs above the water. Fifteen thousand have been taken in a single day." (*Duncan*).

(4) *Teleostei*, or Perfect-boned. The bones, as the name indicates, are perfectly ossified. It is by far the largest Order, and has been divided into five Sections, of which the general characters may be thus tabulated.

Scales not Ganoid	{	rays soft	{	2 pairs of limbs, A. Malacopteri.
		rays spinous.....	{	Ventral fins wanting, B. Anacanthini.
Scales Ganoid ...	{	gills not in tufts	D. Plectognathi.	
		gills in tufts	E. Lophobranchii.	

(A). This Section is divided into two, the *Apoda*, wanting the hind limbs and the *Abdominalia*, with the ventral fins placed far back, towards or near the tail. The most familiar example of the *Apoda* is the Eel, with its scales sunk deeply into the skin; it is placed in this Division on account of the structure of its swim-bladder. The skin is generally furnished with cycloid scales, but a few have ganoid scales. Some few, again, have the first rays of the dorsal and pectoral fins spinous, in which case they may be distinguished from the members of Section C by the position of the

ventral fins. To this Section belong the Pike (*Esox lucius*) and the Flying fish (*Exocoetus volitans*), which does not fly in the strict sense of the word, but can, by means of its long pectoral fins, pass over a distance of 500 feet at one spring into the air.

Section B has also a few species with two pairs of fins, but in this case the ventrals are placed under the throat or in front of the pectorals. The Family of *Pleuronectidæ*, or Flat-fishes, is interesting from the curious modification of the body. When first hatched, the fish are perfectly symmetrical, and coloured similarly on each side. After a time they begin to lie on one side, (sometimes the right, but more frequently the left), and then the eye on the lower side is gradually translated to the upper side of the head; this translation being effected by an actual movement of the lower eye, or by its passing through the, at that time, soft tissues of the head, a partial twisting of the bones of the skull assisting to bring about the final result. When full grown, both eyes are situated on one side of the head, and the fish now keeps this side uppermost, which is dark coloured; the opposite side on which it rests becomes white. An examination of a Flat-fish will show that from the position of the pectoral fins and of the mouth it is the sides which are differently coloured, and not the upper and under surfaces.

Section C has the Ctenoid scales and the ventral fins beneath, or in advance of, the pectorals. This is the most typical of the Teleostean fishes. The Perch, Mackerel, Mullet, Gurnard, Goby, Blenny, &c., belong to this Division. The most interesting species exhibited is the Sucking Fish (*Echeneis remora*), with its flat oval disc on the top of its head, by which it attaches itself to Sharks, Whales, or ships, and is carried by them for great distances. The *Fistularia serrata*, or Flute-mouth, is also interesting; its mouth is very long, with a small opening at the extremity, and the two middle rays of the tail are prolonged into a filament.

Sections D and E, though covered with ganoid scales, are placed in this Order from their internal structure. The most remarkable are the Trunk Fishes, which are covered with an immovable case of large ganoid scales, firmly fastened together, only allowing movement to the tail, fins and mouth. In Section E the most interesting are the *Hippocampi* or Sea-horses; the males have a pouch into which the female puts the eggs, where they are hatched, and to which the young can retire if threatened by any danger.

(5) *Marsipobranchii*. This Order also contains but few species. The body is worm-like with a cartilaginous skull, but no lower jaw and but very rudimentary Vertebrae. There are no limbs, but a median fin runs round the hinder extremity of the body. The mouth is sucker-like. There is only one nostril, a point in which the animals of this Order differ from all other Vertebrates. The most peculiar point is the Gills: instead of being flat comb-

like structures in a chamber opening externally by a gill-slit, they are pouches, whence the name Pouch-gilled. In the Lamprey there are 7 of these pouches on each side. From the mouth proceed two tubes, one on each side of the body, sending off seven branches one to each pouch; and each pouch has also a tube connecting it with the external water by a small hole, so that there are 7 holes on each side of the animal, whence it is often called "Seven-holes." The water is taken in at the mouth, passes down the lateral tubes to the pouches and out again by the holes in the side.

(6) *Pharyngobranchii*. This Order contains but a single species, the Lancelet, found burrowing in sand-banks, especially in the Mediterranean. It is of the very lowest type, every part being at best merely rudimentary. It has no head, no lower jaw, no vertebrae. The throat (or pharynx) is provided on each side with what are believed to be gill filaments (hence the name). There is no distinct brain and but rudimentary eyes and possibly a rudimentary ear.

INVERTEBRATA.

In treating of the Invertebrata it will be impossible to enter fully into the structure of each Sub-kingdom, in consequence of the want of Models, Drawings, or Preparations, and the general outlines alone can therefore be given, with such further details as can be understood by what is at present in the Museum.

It was mentioned that the Vertebrae formed a Canal for the Spinal Cord, which was practically a portion of the Brain; consequently when no such canal exists, no true brain can exist, and hence the Nervous System of Invertebrates consists of "nerve centres" or Ganglia, from which the nerves branch out. There may be several of these ganglia in the same animal, or only one, or even none at all; but it may be noted that, as in the Caterpillar of a Moth, for instance, there are several ganglia, which by the time the perfect insect is developed are much reduced in number, from a union of several into one (not from the disappearance of some), so, as a rule, it may be stated that the fewer the ganglia the higher the organism, but it must be especially observed that this only holds true when the single nerve ganglion has resulted, as it were, from the coalescence of two or more. In the case of the Mollusca, for instance, there are in the typical animal three pairs of ganglia, in the highest and lowest Orders only one; but in the highest Order this one results from the union of the three pairs, whilst in the lowest it is merely a single ganglion, and hence essentially distinct from the former.

It will be best to describe a typical animal in each Sub-kingdom, and then point out the principal modifications in each; of course only taking such

points as are generally applicable, for the number of modifications is innumerable, and there are certain groups whose position is very much disputed, and which are placed in different Sub-kingdoms, according to the opinions of different Naturalists.

The Invertebrata are divided into five Sub-kingdoms, the Mollusca, Annulosa, Echinodermata, Cœlenterata, and Protozoa.

As types of these we may take the Common Snail, the Common Cabbage Butterfly, the Common Sea Urchin, the Sea Anemone, and the Common Sponge.

MOLLUSCA, the Common Garden Snail. The animal is covered with a smooth soft skin, not divisible into rings, and protected by a hard covering in the shape of a shell. It may be divided into a head, a body proper, containing the viscera, and a Foot. The head is furnished with two tentacles, two eyes on long stalks, a pair of ganglia, and a Proboscis, short, and capable of being retracted. There are also ear-cavities, containing ear-bones, or "otoliths;" and a "tongue," consisting of a long Ribbon-shaped body, capable of being moved backwards and forwards, and covered with rows of teeth. The structure of this tongue is most useful for classification, and the number of teeth in some species is astonishing. "The tongue of the Whelk has 100 rows of teeth; and the great slug has 160 rows, with 180 in each row."

The body proper contains a gullet, stomach and intestine, a heart, a liver, an ovary, and a pair of nerve ganglia. It is protected by a large expansion of the skin, called the Mantle; this Mantle secretes the material of which the shell is made, and when it does not cover the shell this latter is protected by a skin, or epidermis, as in the case of the Snail. The shell, being formed of lime, would be very liable to be destroyed by acids, and hence the skin is absolutely necessary for its preservation. The Mantle also forms a chamber corresponding to a lung, connected with the open air by a tube, or Siphon. In the case of water-breathing Molluscs this air-chamber contains the gills, and hence is called the "gill-chamber," even in the case of Land Snails. The "foot" is a broad muscular disc, on which the animal moves from place to place, and is furnished with a pair of Nerve ganglia, thus making three pairs of Nerve ganglia altogether in the animal.

ANNULOSA, the Common Cabbage Butterfly. This passes through four stages, that of the egg, caterpillar, chrysalis, and perfect state. In the Caterpillar stage it consists of a series of rings, forming a long narrow body; these rings are said to be "morphologically" similar, and in fact in some species each ring might be considered an exact reproduction of any other, but in the case of our Butterfly they are, externally, very similar to one another, except the head and those that have some appendages. The former is considered to consist of modified segments, just as the human skull is considered to consist of

modified vertebrae, and as regards the appendages it must be observed that they are always in pairs.

Internally there is not the same repetition, for the digestive apparatus runs from end to end, and the heart consists of a vessel along the back; but the nervous system consists of a pair of ganglia in each segment, connected by a double chain of nerves, so that there is a distinct repetition in this case. So also as regards the breathing apparatus; this consists, not of gills, but of "tracheæ;" these are tubes, branching out in all directions, and communicating with the external air by holes, one on each side in most of the segments, thus making another point of similarity between the segments. By the time the animal has reached its perfect state the viscera have been modified to a certain extent, and more especially the ganglia, which have been much reduced in number by the union of contiguous ones.

From the structure of the Caterpillar, which may be taken as that of the Annulosa, it is evident that this Sub-kingdom is lower than Mollusca.

In the ECHINODERMATA, of which the Sea Urohin has been selected as the type, the digestive apparatus is very much simplified, being merely a bag open at each end, and in some species not even that; the nervous system consists of a ring round the gullet, from which five branches proceed to the five divisions into which the animal may be considered to be divided. There is no distinct heart; and progression is mainly carried on by means of a "water-system." These are tubes terminated by suckers, into which the animal can force water and thus convert them into organs of locomotion.

The parts of the body are arranged round the mouth, and are said to be "rayed;" being disposed like a star. The animal is protected by a covering of plates of carbonate of lime, but not like that of the Mollusca, for outside this "test," as it is called, is a thin layer of the body substance, so that the animal cannot really be considered to be *protected* by its test.

The COELENTERATA, of which the Sea Anemone is a good example, have a still more simple organisation: the digestive organ may be compared to a tube inside the body cavity; there are no distinct nerves or heart or breathing apparatus; in fact it may be considered to be merely one tube inside another with a fringe of tentacles round the mouth.

Finally the PROTOZOA, as represented by the Sponge, are structureless animals, without stomach, heart, or nerves; for a long time the Sponge animal was considered to be merely a film of gelatinous matter spread over the supporting framework (commonly known as the sponge of Commerce). The surface of the sponge is pierced with holes of two sizes; through the smaller of these holes water is continually entering and then rushing out in a stream through the larger ones; this current is kept up by a number of chambers just beneath the superficial layer of "sponge-flesh," lined with

numerous hairs or "cilia," attached to "sarcoids" of rather a complicated structure, and which thus raise the sponge much higher in the scale of animal life than it formerly held, low as it is even now.

MOLLUSCA.

It may seem strange at first sight that the Cuttle-fish should be classed with the Snail; but they are really very closely related. The Snail is similar to the Slug, which apparently has no shell, but if the mantle below the smooth part on the back be examined, a small oval shell will be detected. Imagine now a Slug to have its mantle entirely surrounding it and the foot to be more expanded and split up into portions to form the arms and a Cuttle is practically made. The main differences are that the eyes are very highly developed and very large, and that, being an aquatic animal, it has gills. The same "shell" which can be found in a Slug is also represented in the Cuttle, only more bone-like. In some species this is horny, instead of bony, and in one case this is a tube coiled round into a flat spiral, like a watch spring, the tube being divided by numerous cross partitions. In some fossil species, called Belemnites, this shell was straight and protected by a horny guard, and as a rule this guard is the only remaining part of the fossil, called the Belemnite. The chambered part is called the Phragmacone. The animal breathes by means of gills in the gill-chamber, formed by the mantle; by expanding and contracting this mantle water is admitted to the gills and discharged through a siphon, very visible in the models. When the animal performs this "breathing" very rapidly, it goes backwards in the same manner as a rocket when fired, and can then go through the water at a great rate; but it can also go forwards by flapping its fins, or projections of the mantle, on each side; it can also go along head downwards at the bottom of the water by means of the suckers attached to its arms, and from this fact the class is called Cephalopoda, or Head-footed. The mouth is furnished with a pair of jaws like the beak of a parrot, and also a long tongue, partly clothed with teeth, as in the Snail, but also with the means (probably) of tasting.

Besides the internal shell the animal has also an "ink bag," from which it can discharge an inky fluid and thus escape from its enemies. This has been found in a fossil state. Cuttles lay eggs; a full-grown specimen will lay from fifty to sixty thousand, in bunches, each attached to a separate thread, like a bunch of grapes. The female guards these eggs with great solicitude for no less than fifty days, and the young, when first hatched, are like fleas in size and also in colour if disturbed.

CEPHALOPODA are divided into two very distinct Orders, according to the number of the gills; the *Tetrabranchiata*, with four gills in two pairs; and the *Dibranchiata*, with two gills.

Of the former there is only one living representative, the Pearly Nautilus. It has numerous arms without suckers and an external shell, and having this protection it has no ink-bag. The *animal* has been very rarely seen. The shell is very peculiar, being divided into partitions like the Phragmacone before described; but besides the partitions each chamber is connected by a "siphuncle," a canal running through the centre of each partition but not communicating with the chamber; its use is quite unknown. The animal lives in the last and largest chamber, and is fastened to the shell as an ordinary Mollusc.

The *Dibranchiata* are divided into two divisions, the Octopoda with eight arms; and the *Decapoda*, with ten.

The *Decapoda* have two of the ten arms much longer than the rest, expanded at the extremity and capable of being retracted. There are also lateral fins, formed of expansions of the mantle.

The three principal families are the *Teuthidæ*, with a horny shell, like a pen in shape; the *Sepiadæ*, with a light "bone" of a spongy texture, and which is generally known by the name of Cuttle-bone or Sepiostaire; and the *Spirulidæ*, with the phragmacone as described above, something like the shell of the Nautilus. Though the shells occur in enormous quantities in certain places, a single perfect animal has only hitherto been obtained.

To these may be added the fossil family of the *Ammonitidæ*. In many respects these resembled the Nautilus, only the siphuncle, instead of being in the centre, ran round the outer edge of the shell; and the partitions between the chambers were very complex, instead of being simple or slightly lobed on the edge. The two families are also similar in having numerous sub-families, founded on the convolutions of the shell; some being quite straight, others merely bent, others spiral.

Of the *Teuthidæ* the Common Squid (*Loligo vulgaris*) is the most abundant. It is met with in shoals around the Cornish coast, where the fishermen call them the Pen-and-Ink fish from the readiness with which they discharge the contents of their ink bag when alarmed, and from having a delicate internal shell like a pen, from which circumstance it is also called the Calamary, several of which may be found packed together in old individuals.

The spawn consists of dozens of semi-transparent, gelatinous, slender, cylindrical sheaths, about four or five inches long, each containing many ova embedded in it, and all springing from one common centre, and resembling a mop without a handle. As many as 42,000 perfect young Squids have been

counted in one of these Sea-mops, which are found floating about, unattached to anything.

Squids of enormous size have been seen and captured, or rather portions of them have been secured, by which the size of the whole animal could be calculated. A portion in the Museum of St. John's, Newfoundland, came from an animal 60 feet long; and another was estimated to weigh upwards of 2,000 lbs.

Of the *Sepiadae*, the Common Cuttle fish (*Sepia officinalis*) is seldom seen, though its "cuttle bones" or *sepiostaires* are common enough. It is a very active animal, and as it cannot see behind it, it cannot live long in confinement, as it knocks itself against the sides of the tank, and the skin gets worn through, exposing the edge of the *sepiostaire*, and death then ensues. It has also been known to ground itself high on the beach in one of its "headlong" flights. The eyes are very peculiar, the crystalline lens is very solid and almost calcareous; it consists of two portions which can be easily separated and exhibits internally a beautiful play of colours. In some parts of Italy these are used for necklaces, and the ancient Peruvians also used them as ornaments and for putting in the eyes of their mummies.

Of the *Octopoda* there are two Families; the *Argonautidae* and the *Octopodidae*. Of the former there are only four living representatives. The Paper Nautilus (*Argonauta Argo*) and the Octopus (*Octopus tuberculatus*) are the best known examples, and of the latter there are between 40 and 50 species. The Paper Nautilus has two of its arms curiously lobed, or furnished with membranous expansions, which were formerly imagined to be used as sails, old drawings representing the animal sailing about with these two arms lifted up as if catching the breeze. This is now proved to be an utter mistake; the two "sails" are spread over a very delicate shell, which has been secreted from them and which is thereby protected by them; but what is quite unique about this shell is that it is perfectly distinct from the animal, there being no organic connection between the body and the shell; the animal merely rests in the shell using the central upper part as a receptacle for the eggs. It either swims backwards by ejecting water from its funnel, like other Cuttle-fishes, or creeps along, head downwards, at the bottom of the sea. The female alone secretes a shell; the male, which is much smaller, is naked and looks like a little Octopus with short pointed arms. The third arm on the left side is specially modified and is said to be "hectocotylised," being in some instances entirely detached, thus forming as it were a distinct organism with independent powers of locomotion of its own. The "hectocotylus" of the Argonaut resembles a little worm with two rows of suckers along its length, a long thread-like appendage at one

end and a small swelling at the other. It is in fact only an arm irregularly metamorphosed and spontaneously detached.

The Octopods, or Poulpes, are not uncommon, but difficult to catch, as they can force themselves into very narrow crevices, from which it requires great force to remove them, and also because they can vary their tints according to the nature of the ground over which they pass, as well as being able to discolour the water with a dark chestnut-brown ink. The internal shell is very rudimentary and the arms are alike, but unequal in length, and are united at their base by a broad web. It has also the power of reproducing lost tentacles.

GASTEROPODA. A typical Gasteropod, the Garden Snail, has been already described; but it will be necessary to say a few words on Gasteropoda in general.

The Respiratory apparatus is naturally of two kinds, according as the animal breathes air or water. For those which breathe air, a fold of the mantle forms a lung chamber, but in the case of those which live in water there are three modifications: (1) The blood may be exposed to the water in the thin walls of the mantle cavity as in the first case; or (2) The respiratory organs may be in the form of tufts on the back and sides of the animal; or (3) There may be gills in a gill chamber. There are also generally two Siphons for the access and egress of the water.

The shell is generally in one piece, and is strictly a cone, in its simplest form like that of the Limpet (*Patella*); or it may be elongated so as to form a tube, as in *Dentalium*; or it may be coiled into a spiral. In some few cases the coils are not in contact, as in *Vermetus*, but more generally they are amalgamated together; the coils may lie in the same plane, as in *Planorbis*; or may form a true spiral, and according to the shape may be "turreted," "trochoid," "turbinated," and so on. The last and largest whorl is called the "body-whorl," the other whorls together make up the "spire;" the grooves formed by the junction of the whorls are called "sutures;" and the axis round which the whorls are coiled the "columella." A Gasteropod which feeds on vegetable food has the aperture generally round, but when on animal food, it is notched or produced into a canal.

In some species, the shell is "multivalve," being composed of eight transverse plates, embedded in the mantle, or there may be two "accessory valves."

As regards the classification of the Gasteropoda, the main divisions seem to be pretty nearly fixed, but the order in which they come varies according to each Author. According to Nicholson, there are two sub-classes (1) *Branchiata*, those with gills or branchiæ, and (2) *Pulmonata*, those breathing by lungs.

Branchiata, are divided according to the position of the gills, into three Orders, with a small extra Order for the Genus *Dentalium*.

Pulmonata are divided into two Orders, according as they have an "operculum" or not. This operculum is a disc of horny or calcareous matter, secreted by the foot, for the purpose of covering the mouth of the shell when the animal has withdrawn inside it. As Professor Nicholson has been followed hitherto, and as he has founded his arrangement according to the most recent discoveries, his system will be here adopted, though in the Collections the Specimens have been placed according to Woodward, as that book must be used for the study of the species.

The *Pulmonata* are generally Land or Fresh-water-shells, and consequently have the shell very much thinner and more delicate than Sea-shells. The Slugs (*Limax*) have little or no shell, and, when present, it is generally inside the mantle, and merely serves as a protection to the breathing apparatus. Of the Land Snails, the genus *Helix* (containing the common Garden Snail) is the most important. They are found in all parts of the World, and over 1600 species have been described. The most interesting is the Roman Snail (*H. Pomatia*), highly prized as food by the Romans, who introduced it into England; it is still found in the neighbourhood of old Roman Stations and Villas; and occurs in a Wood at Ramsbury.

Of the *Branchiata*, the Orders are (1) *Nucleobranchiata* so called because the respiratory and digestive organs form a sort of Nucleus on the posterior part of the back: (2) the *Opisthobranchiata*, with the gills more or less completely exposed towards the rear of the body; (3) *Prosobranchiata* with the branchiæ situated in advance of the heart; and (4) *Scaphopoda* including the genus *Dentalium*, with its pointed foot like a boat.

Of the *Nucleobranchiata* the *Carinaria* is a long animal with a small shell on one side corresponding to a fin on the other; being free-swimming animals they move about by movements of the tail or fin; to the fin is attached a small sucker by which it is able to fasten itself to seaweed. Small as the shell is, the animal is as much as four or five inches long.

Of the *Opisthobranchiata* we have very few representatives.

The *Prosobranchiata* include the majority of the *Gasteropoda*, and are divided into four Sections, two, the *Siphonostomata* and *Holostomata*, according as the aperture of the shell is notched or produced into a canal, or is simply rounded. It will be remembered that these points indicate generally the nature of the food. The other two have been lately formed for the *Chitons*, with their multivalve shells, and the *Limpets*.

The *Chitons* have no eyes or tentacles, but can move about on their broad foot or disc, and when removed from the rock, can roll up like an Armadillo.

The *Limpets* never move far from one spot and always return to it after feeding; firmly as they can adhere to the rock, the Oyster-catcher, which lives upon this animal and not on the Oyster, displays wonderful adroitness in undermining the shell and securing the animal.

The two next Families are very similar, externally, to the Limpet, but the Bonnet-Limpet (*Capulus*) has the apex of the shell divided by a shelly partition to which the muscles are attached, and the Cup-and-saucer-Limpet has a half cup-shaped process attached to its apex; the *Phorus* or Carrier, belonging to this Family, is peculiar for fastening fragments of shell to the outside of its own. In the Key-hole Limpet (*Fissurella*) there is a notch in the front margin of the shell, or else a perforation at the top, through which the siphon passess.

In the next Family, *Haliotis*, or Venus' Ear, the excurrent siphon is accommodated by a hole near the lip of the shell, and this is repeated, so that there is a series of holes along the shell; this seems to be a repetition of the structure in *Fissurella*.

The remaining Families in this division (*Halostomata*) are most readily known by their forms, which are very characteristic; the *Neritas* dissolve the interior of their shells to obtain more room for their soft bodies; the *Turritellas*, on the other hand, partition off the top of their shell; and the Genus *Vermetus*, or Worm-shell, though regularly spiral when young, gets very irregular in its old age, and continually partitions off the unused portion of its shell.

The other Section (*Siphonostomata*) contains some very large families. The *Cypræas*, or Cowries, when young, have cylindrical shells, as they grow older they are more like those of an Olive, they then thicken the outer lip of the shell and ultimately place a series of teeth on each side of the mouth, at the same time making the last whorl very large, so as to cover (wholly or partially) the other whorls and remove all trace of the axis of the shell, so that finally its shape is very different from what it was at first. The shell is beautifully smooth and polished, from being covered by the largely expanded side lobes of the mantle, so that its beauty is not seen till the animal has been removed. There are no less than 150 species of Cowry, the most important being the Money Cowry, tons of which are imported from the Pacific and Eastern seas into England and then exported to the West Coast of Africa, to serve as money.

Another large and important Family is that of the *Conidae*, or Cones. When alive the shells are covered with a dull yellowish brown epidermis, and it is only when they are properly cleaned that the beautiful colours appear. There are about 300 species, some of them very costly; the *Conus Cedo-nulli* is extremely rare in fine condition, no less than £16 having been given

for a single specimen. Another genus in the same Family, *Pleurotoma*, has over 500 species in it.

Of the *Buccinidæ* the Olives are an important genus, over 117 species having been described; beautiful as they are, the shell is covered during life by the mantle, and is almost sunk in the large foot, so that its beauty is not seen till it is properly cleaned. The *Purpura Lapillus*, the only species of the Genus found in England, is abundant in some places, and was formerly taken in great numbers for a peculiar blue dye, but its numbers have been so diminished that they are no longer taken for that purpose. They are very destructive to mussel-beds, but it also devours Winkles, Limpets and Trochi; after gorging himself he lies for weeks without attempting to get a fresh supply of food. The *Magilus* is another interesting animal: when young the shell is like an ordinary spiral shell, but as it grows older it burrows into Coral, forming a long tube as it goes along, eating up the Coral animals and depositing the lime obtained from the coral structure at the further end of the tube, which thus gets continually filled up as it increases in length; it always remains concealed till the mass of the Coral is cut open, exposing the tortuous and solid, but once tubular shell. The *Buccinum*, or Whelk, is often consumed as an article of food; it is carnivorous, living upon Bivalves, especially those which live buried in mud. To enable the animal to breathe whilst burrowing for its food, its siphons are very long; the nidal capsules of the Whelk have about six young in each.

Of the *Muricidæ*, the Genus *Murex* is noted for containing the animals from which the Tyrian dye was obtained. Most of the species have three rows of spines, of which the Venus' Comb (*Murex ternispina*) is a very good example, but the Murices generally are very handsome shells for this reason. Finally, the Family of the *Strombidæ* have usually a wide expanded lip, and are often covered with spines; some attain a large size, and enormous quantities are brought from the Bahamas for the purpose of making Cameos and for the Porcelain Works.

The PRTEROPODA form a small Class of animals, living in the open sea and are met with in countless thousands in all parts of the ocean; they form a large part of the food of the Whale, and of many Sea Birds. They bear a considerable resemblance to young Gasteropods, only of much simpler structure, and therefore have generally been placed below that class. They derive their name from two expansions of the foot, one on each side of the neck, by the flapping of which they are able to move through the water. They are divided into two Orders, the *Thecosomata*, possessing an external shell and an indistinct head, and the *Gymnosomata* without a shell, but with a distinct head and fins attached to the neck. Models of the *Cymbulia*,

belonging to the first, and of the *Clio*, belonging to the second Order, are exhibited.

The next Class of Mollusca consists of those animals which have no distinct head or lingual ribbon, but are protected by a bivalve shell, and have one or two gills on each side, and hence called LAMELLIBRANCHIATA.

Each shell may be considered as a hollow cone, with the apex turned to one side, so that more of the shell is on one side of the apex than the other. This apex is called the beak or *Umbo*, and is almost always turned towards the mouth of the animal, and the side of the shell on which they are situated is the *dorsal* side, the opposite side, where the shells open, being called the *ventral* side or *base*. The two valves are generally similar, though in the oyster and some others, which habitually lie on one side, one valve is deeper than the other, the deeper side being that on which the animal lies.

The two valves are united by teeth, which interlock with one another and form very important points for classification. Outside the shell and behind the "beaks" is a ligament stretched from one side to the other, and so arranged that when the valves are closed the ligament is on the stretch. Inside are either one or two muscles, attached at each end to the two valves, by the contraction of which the animal can close its shell, so that to open it, it is only necessary to relax the "adductor" muscles, as they are called, and the ligament outside contracts and separates the valves. The body is always enclosed in the mantle, from which the shells are secreted.

The gills are in the form of plates composed of tubular rods and covered with "cilia," minute hairs, which by continually vibrating cause a current of water to flow over them. Sometimes the lobes of the mantle are closed in front, so as to form a gill-chamber, and then the animal has two tubes or siphons, sometimes of considerable length, for the entry and exit of the water. These siphons are especially characteristic of those Lamellibranchiata which spend their existence in the sand or mud. They bury themselves by means of a large muscular foot, which they protrude and force downwards and then by contracting it drag their body down into the mud. The most important of the Bivalves is the Oyster (*Ostrea edulis*). The animal takes about five years to come to perfection for the Table, and the young, or "spat," is provided with cilia by which it is able to move about till it meets with a suitable spot for permanently fixing itself. A single Oyster will send out as many as from 276,000 to 829,000 young, but as may be supposed enormous quantities perish. The greatest enemies to the Oyster are the Star-fish (to be described hereafter), the Dog-Welk (*Nassa*), which bores a hole through the shell to get at the animal inside, and cold, which is particularly fatal to them.

The *Anomia*, allied to the Oyster, has a notch or hole in the right valve for a plug by which it is able to attach itself to objects. The *Placuna* or Chinese Window-shell, is used for windows, being translucent; those from Lake Tamblegam, near Trincomalee, are especially beautiful and so plentiful that 18,000,000 were taken in 3 years. The *Pectens*, or Scallops, are generally brightly coloured, and when young swim about very freely by rapidly opening and closing their valves; when old they are sedentary. The *Spondylus*, or Thorny Oyster, is a very beautiful shell, but its beauty can only be properly seen when it has been carefully cleaned. Of the *Aviculæ*, or Wing shells, the *Meleagrina* is used for its Mother-of-Pearl, and is often called the Pearl Oyster. As much as 150 tons are imported into Liverpool annually for the Mother-of-pearl, used for inlaying. The pearls used in Jewellery are obtained mainly from the Persian Gulf and Ceylon; they are caused by grains of sand or other impurities getting inside the shell and causing irritation to the animal, when it deposits layers of "Nacre" over it, forming a projection in the interior, generally more brilliant than the rest of the shell. Completely spherical pearls can only be found loose in the muscles and other soft parts of the animal. The Chinese often insert foreign bodies inside the shell and thus produce pearls of particular shapes.

Of the *Mytilidæ*, the Common Edible Mussel (*Mytilus edulis*)—forms an important article of food in some places; it is destructive to Oyster beds, if it happens to settle down in them, as it throws out a number of fine threads to secure its position, and this causes an obstruction to the water flowing over it which thereby makes a miniature sandbank, sufficient to bury the neighbouring oysters and thus kill them. These threads, which are very strong, are called the Byssus, and though detrimental (indirectly) to Oyster beds, are extremely useful in another way, for the strength of the thread is such that they are thrown down in boat-loads on newly made Sea embankments, to serve as a means of binding the stones together and thus make the Wall more secure. The *Lithodomus*, or Date shell, bores into Coral and Limestone Rocks. Of the *Gastrochænidæ*, the *Saxicava* bores into the rocks, and a specimen of rock so bored is exhibited; but the *Aspergillum*, or Watering-pot Shell, is more interesting; "in certain boring and burrowing bivalves, the shell does not increase with age, but the siphons secrete a shelly tube in which the soft parts of the animal are encased, and the minute valves of the young Mollusc are seen embedded in the wall." In the specimens exhibited the small bivalve shell may be seen at one end, and at the other a series of "frills." Of the *Pholadidæ* the *Pholas* is furnished with some extra valves for the protection of the hinge; it burrows into rocks, and the delicate white shell with its rasp-like projections seems an insufficient means for such a purpose, but

it has been pointed out that the foot may serve as a more important instrument than the shell. Lastly the *Teredo* is perhaps the most destructive animal of the lot. The shell is small but the animal itself is ordinarily a foot long, though specimens have been seen as much as two and a half feet long. It lines its burrow with shelly matter and can destroy any wood however hard in a wonderfully short time.

We now come to a group of three Classes, the BRACHIOPODA, the TUNICATA and the POLYZOA, which are placed among the Mollusca, but form a separate Division, under the name of MOLLUSCOIDA; but there are great differences of opinion as to where they ought to be placed. They are placed here only provisionally; as when their development is more exactly understood, it is probable than one at least may be placed in the neighbourhood of the Annelida.

The first of these Classes, the BRACHIOPODA, or Lamp-shells, bear some resemblance to the Lamellibranchiata, from being protected by a bivalve shell, but this resemblance is only superficial, as the organisation is much inferior. The two valves are not right and left, as in Lamellibranchiata, but dorsal and ventral, one is always smaller than the other and they are kept together by an apparatus of teeth or merely by muscular action alone. The ventral valve is usually the largest and is furnished with a beak, often perforated by a hole for the transmission of a muscular "peduncle," whereby the shell is attached to some foreign object. In the *Lingula*, this peduncle simply passes between the valves and there is no hole. The digestive organs and muscles occupy but a small space near the beak of the shell, which is partitioned off by a membrane, perforated by an aperture for the mouth. The remainder of the cavity of the shell is almost filled by two long "arms," whence the name of the Class, Arm-feet. These are tubular prolongations from the margin of the mouth, usually of great length, closely coiled up and fringed on one side with Cirri, or ciliated processes. There are two Orders, of which the *Terebratula*, with its toothed hinge, and the *Lingula*, without a hinge, are two types.

TUNICATA or ASCIDIODA. Externally, a simple Ascidian may be compared to a double-necked jar with two prominent apertures. There are two coverings, an outer one, leathery or cartilaginous, corresponding to the shell of Brachiopoda, and an inner one very elastic, composed of muscular fibres, corresponding to the mantle, and united to the outer covering at the apertures. There is some difference of opinion as to the internal structure, but it has round the mouth a set of small tentacles, a large gill-chamber (or what apparently corresponds to it; the gills are not present, but the walls are perforated with numerous holes); a gullet, stomach, and intestine; and a

second chamber, called the *atrium*, communicating with the external water by the second opening mentioned above. There is also a single nerve ganglion ; a heart, consisting of a tube open at both ends ; and generally some rudimentary eyes ; and a ear capsule containing a ear-bone or otolith. This Class is interesting from the larva ; this is generally shaped like a Tadpole, with a peculiar rod-shaped body in the tail, and has been considered to be anolagous to the early stage of the Backbone in Vertebrata, and hence that Man must look on this larval, imperfect, Ascidian, as one of the links in his genealogy. This however has been greatly disputed and has certainly not been yet scientifically proved. In this Class too we first meet with "compound" forms, the "Zooids," as the individuals are called, being aggregated into a common mass, their coverings fused together but each perfectly distinct, without any internal union.

POLYZOA. These animals bear a considerable resemblance (structurally) to the Tunicata, having the double covering and the single nerve ganglion, but differing (1) in having a much more simple digestive apparatus, merely a gullet, stomach and intestine, bent up into the form of a V ; (2) in the mouth being surrounded by feathery tentacles, which can be retracted or protruded at pleasure ; and (3) in the animals always being in colonies, the original repeating itself by "gemmation" (i.e., by sending forth "buds," which develop into exact facsimiles of the original) in definite directions, all organically connected, but each Polyzoon perfectly distinct. The muscular system is well developed, the most important muscles being those for drawing in the upper part of the animal within the cell. They are extremely beautiful animals, but very small, living attached to weeds in water. Gemmation progresses throughout the summer, eggs are sent forth, and the animal (when first hatched from the egg) swims about till it secures a suitable spot, when gemmation begins. But there is also another form of increase. At certain seasons of the year curious bodies, like lenses, called "statoblasts," are developed in the body cavity ; they consist of two horny discs, strengthened by a ring running round the margin, and of a different structure from that of the discs. These statoblasts are not released from the body cavity till after the death of the parent, but when placed in favourable conditions for development the two discs open, and a young Polyzoon, already in an advanced stage of development and in all respects resembling the adult individual in whose cell the statoblasts were produced, comes forth. These statoblasts are enabled to float near the surface of the water in consequence of the cells of the marginal ring being filled with air. Beautiful drawings of two kinds of Polyzoa and their statoblasts are exhibited.

ANNULOSA.

The Annulosa form a most extensive Sub-Kingdom, and embrace a great variety of animals. It is divided into three Divisions, (1) *Scolecida*, animals without lateral appendages; (2) *Anarthropoda*, animals with locomotive appendages, but never jointed or articulated to the body, consisting merely of hairs or tubercles; and (3) *Arthropoda*, animals with jointed appendages attached to the body by proper articulations.

A large number of animals in this Sub-Kingdom breathe by what are called *Tracheæ*; these are tubes ramifying in all directions throughout the body, and communicating with the external air by apertures in each segment, or nearly so. In order to keep them continually open for the passage of the air, a fine spiral thread lines them throughout, in just the same manner as a coil of wire is placed in india-rubber tubing for the purpose of allowing an uninterrupted flow of gas from a gas-pipe, however much the tube be twisted about. The openings in each segment are called *Spiracles*, and if an insect has to be killed by suffocation, these spiracles have to be stopped up, and not the head squeezed.

There are four main Classes of ARTHROPODA, (1) *Crustacea*, these breathe by means of Gills, have two pairs of Antennæ, more than 8 pairs of legs, and some jointed appendages to the abdomen. (2) *Arachnida*, these breathe by means of tracheæ, have no antennæ, eight legs, and no jointed appendages to the abdomen. (3) *Myriapoda*, these breathe by tracheæ, have one pair of antennæ and numerous legs. (4) *Insecta*, these breathe by tracheæ, have one pair of antennæ, six legs, and generally two pairs of wings.

These characters are only *generally* applicable to the animal in its perfect state; in almost all cases the lowest forms are very aberrant, and are placed with the animals to which they are most nearly allied.

INSECTA. The *Wings* of Insects do not correspond in any way to those of a bird; they are expansions of the skin of the body, supported by slender but firm tubes, known as "nervures." Each nervure consists of a central trachea, or air tube, running in the centre of a larger blood-tube, so that these wings not only act as organs of flight, but also assist in the process of respiration. The modifications of the wings are very various. Properly there are two pairs, but in *Diptera* the under pair is replaced by two small organs, like pins, called "balancers;" in *Strepsiptera* the upper wings are replaced by two twisted filaments; in *Coleoptera* (Beetles) the upper wings are converted into horny covers, called "Elytra;" in *Hemiptera* the portions nearest the body are horny, the outer portions being membranous; in *Lepidoptera* the wings are covered with scales, giving them their well-known beautiful appearance.

The *Legs*, in the perfect insect, are always six, but in the larval state there are generally many more, or there may be none at all; when there are more, the first six legs are different from the others, which are only temporary and disappear when the animal reaches its perfect state.

The *Mouth* is extremely varied, but all are modifications of one type. If we imagine the jaws of a man to be divided into two by a division in front, whilst the two pieces worked from side to side instead of up and down, the upper and lower lips remaining the same, we shall get most of the parts of an insect's mouth; there will be an upper lip, a pair of upper jaws (called *mandibles*) a pair of lower jaws (called *maxillæ*), and a lower lip; besides these we must imagine a pair of organs, called "palpi" (supposed to be organs of touch) attached to the lower jaws and a pair to the lower lip, and we shall then have all the essential parts of the mouth by the modifications of which all the varied structures met with are produced. In those insects which bite their food and have what is called a masticatory mouth, the upper jaws (*mandibles*) are fully developed, the lower jaws (*maxillæ*) being only rudimentary: in those on the other hand, which suck their food, as the Butterfly, the *mandibles* are rudimentary, and the *maxillæ* are enormously developed, each *maxilla* has an air tube running throughout its length, and is scooped out along its inner surface, so that when the two *maxillæ* are joined together, which is done by means of a series of hooks, a large central tube is formed through which the insect sucks up the honey from the flowers; this "proboscis" is therefore essentially distinct from the trunk of the elephant. In some insects the lower lip is divided into two, the part furthest from the body being much more flexible than the other, and this part is often developed into a kind of tongue, as in Bees; in these animals the upper lip and *mandibles* are well developed and retain their usual form, whilst the *maxillæ* and lower lip are greatly elongated, the former forming a tubular trunk, as in butterflies, only not capable of being rolled up. In Hemiptera, the *mandibles* and *maxillæ* are converted into four lancet-shaped needles, the lower lip being elongated to form a kind of sheath to protect them.

It will be necessary to bear in mind this structure of the mouth, as it is singularly modified in the Crustacea and Arachnida.

The Classification of Insects is very difficult, as there are no particular features universally applicable for the purpose: the most convenient is that of their transformations, but this fails in some cases. Insects, as a rule, pass through certain transformations, or metamorphoses, ere coming to the perfect state. Those which do not pass through any change, but emerge from the egg similar to their parents in all respects except in size, form one Section, the *Ametabola*. In others the young (or *larvæ*) on emerging from the egg, differ from their parents in little

else than the absence of wings; they are active and locomotive, and when they change to the next stage (that of the pupa), they are still active, but have the rudiments of wings, and the pupae are converted into the perfect insect only by the liberation of the wings. From the comparatively small difference between the stages this metamorphosis is said to be *incomplete*, and the insects forming this Section are called *Hemimetabola*. The third Section the *Holometabola*, comprise those insects whose metamorphoses are distinct, the larva and pupa being very different from the perfect insect. The *Holometabola* are divided into six Orders.

The COLEOPTERA, or Beetles, have a mouth for masticating, and the upper wings horny, useless for the purposes of flight, but serving as a protection to the lower membranous ones, which are folded up underneath them. Among the numerous species composing this Order may be mentioned the Tiger-beetles (*Cicindelidae*) with their bright colouring, swift movements and carnivorous propensities; the Water-beetles (*Dytiscidae*) with their boat-shaped bodies and long hind legs suitable for swimming; these insects take down a supply of air under their elytra, and when that is exhausted put their tails just above the surface to get a fresh supply; at night they come out of the water and fly about. Of the *Carabidae* the most curious is the singularly flat *Mormolyces phyllodes*, from the Malay Peninsula. The *Lamellicorns* are remarkable for the large size of some of the species; the Cock-chaffer is very injurious, and as it lives three years in the larval state, it does great damage to the roots of plants, especially grasses, as it burrows under ground; its great enemy is the Rook, which naturally has to dig up the grass in searching for it, yet notwithstanding the benefits which it thus renders to the Farmers, the Nairnshire Farmers' Association have killed 10,000 Rooks in the last two years! The *Buprestidae* are noted for their brilliant metallic colouring; the *Longicornia* for the length and beauty of the antennae; and the *Curculionidae*, or Weevils, for their long snouts, of which no less than 30,000 species are supposed to exist. These last are terribly destructive, infesting every part of the plant, and the maggot so often found in nuts is the larva of a Weevil; but the most beautiful of all are the Diamond beetles with their patches of minute scales presenting the appearance of rows of diamonds. Lastly the *Coccinellidae*, or Lady-birds, of inestimable use in Hop Gardens, as their larvae destroy such quantities of the Aphis, or "Fly," one of the greatest enemies to the Hop Grower.

The HYMENOPTERA have the mouth provided with mandibles and generally also a suctorial organ formed of the maxillae and lower lip; the wings are membranous, though sometimes absent; the female is furnished with an ovipositor, modified so as to constitute a saw, a boring organ, or a sting. In this latter case the insects form a sub-order, the *Aculeata*, the principal families of which are

the Bees, Wasps, and Ants. It is impossible to enter into a detailed description of these insects, but it may be stated that many species live in communities, though "solitary" species are not uncommon; there are also in the "social" species at least three distinct kinds of animals, the females, the males, and the neuters, or workers. In the Hive Bee, there is only one female, the Queen, whose sole occupation is to lay eggs. At a certain season of the year the males, or Drones, are produced in great numbers; they do nothing for the general good of the community, but their numbers serve to keep up the temperature of the hive, and that is a very important point; but they do not collect honey, or build comb, and merely spend their time in consuming the honey already stored by the workers, who at the end of the season drag them out and kill them. The Queens are reared in special cells on special food, and if by any chance the old Queen dies, the Workers have the power of rearing another, and for this purpose select an egg, enlarge its cell by destroying the surrounding ones and increasing the walls, and then feeding the young grub on a particular kind of food. If the hive is suspected of being queenless, a queen-cell from another hive, with the pupa ready to hatch out, is sometimes placed in it, when, if the new queen is required, the bees will take to her, but should they have a queen and do not require a new one, they will wax down the queen-cell that was inserted so that the young queen cannot hatch out; a specimen of a cell so waxed down is exhibited. Bees have many enemies; the most destructive in a hive is the Wax Moth, the larvæ of which spin long galleries through the comb, and quite destroy it. They build their comb hanging down vertically, with cells on each side. Wasps have a large number of females and about as many males in the same nest, both of which work as hard as the Workers; a few females survive the winter, each of which founds a nest the next year. No honey is stored up. The combs are made of the fibres of rotten wood, and are built horizontally with the cells on the under surface, in which the grubs live head downwards.

Of solitary Wasps, the nests of the *Pelopæus spirifer* are exhibited; these insects build nests of clay, containing several cells, in each of which an egg is placed and a store of spiders for the use of the grub, when hatched. The spiders are stung ere being placed in the cell, in such a manner that they are rendered torpid and live long enough to supply the grub with food. There are several other kinds both of solitary Wasps and Bees.

Ants are not represented in the Museum.

The sub-order, *Pupivora*, includes the Ichneumon Flies and Gall-flies. The former lay one or more eggs in the larvæ of other insects; the maggots from these eggs feed on the larvæ in which they are laid, avoiding any vital parts till they are full fed, when they kill their host. Sometimes the larva is not killed till it has turned into a chrysalis, when, instead of a moth emerging,

an Ichneumon-fly appears. Specimens of the larva of the Eyed-hawk (*S. ocellatus*) with numerous maggots, and of the Elephant-hawk (*C. Elpenor*), with one parasite, are exhibited. The *Ephialtes Manifestator* with its enormously long Ovipositor, for getting at larvæ boring in the trunks of trees, is interesting. The Gall-flies lay their eggs in vegetable matter, and at the time of depositing their eggs they also inject some poison into the plant, which causes the part to swell and form a "nest" for the larvæ. The Marble-Gall, so common on Oaks, and the Bedeguar-Gall of the Rose are exhibited. The third Sub-order, *Terebrantia*, is represented by the *Sirex gigas*, the larvæ of which do much damage to the Fir trees by boring galleries in the branches.

The LEPIDOPTERA, containing the Butterflies and Moths, have a suctorial mouth, furnished with a long "proboscis," described above, and the wings covered with scales. The former, known by their antennæ being expanded into a club at the end, include some of the most gorgeous insects, and the similarity of the colouring of the Wings in each family is interesting. The larva of the Common Cabbage Butterfly merely devours the edges of the outside leaves, whilst that of the Cabbage Moth burrows into the cabbage and ruins it; models of the working of these two are exhibited in the upper compartment.

The Moths are divided into six families, (1) *Sphinges*, or Hawk-moths, with their thick bodies; (2) the *Bombyces*, with large wings and thick bodies. These are the most gaily coloured of the Moths, and many of them are commercially useful for the silk with which they make their Cocoons (a specimen of the silk of the Tusseh Silk-moth is exhibited in the upper case); and among them are some of the largest of the Lepidoptera, though the largest of all is the Great Owl Moth of Brazil (*Thysania Agrippina*), belonging to the next Family (3), the *Noctuæ*, or Night Moths, of which the colours are generally very dull; some, however, have most beautiful markings, though not conspicuous. The next Family (4), the *Geometridæ*, have small bodies and large wings, and have some resemblance to Butterflies; the larvæ of many of these moths are singularly shaped and coloured, resembling bits of stick, and as they have legs only at the two extremities of their body, they sleep with their bodies projecting out from the branch on which they are resting and thus appear as if they were actual parts of the plant. The few species from Australia are remarkable for the generally yellow colour of the wings, said to be caused by the bright sun. The members of the next Family (5), the *Tortricidæ*, are generally small. Many of the larvæ roll up a corner of a leaf to form a habitation, others live inside fruit; models of an apple and pear, showing the manner of the injury they cause, are placed near the moth into which the caterpillar turns. Small as the insects are, they yet do immense

mischief from the numbers which attack a single plant. The last Family (6), the *Tineidae*, consists of small moths, often very minute; many species pass the caterpillar state inside the leaf of the plant they infest, forming galleries or blotches, which are very visible, and reveal the existence of the insect, when it would be almost impossible to catch it in the perfect state. For exquisite and metallic lustre these insects far surpass any others.

The DIPTERA are scarcely represented at present. As their name indicates, they are at once known by having only one pair of wings, the lower pair being replaced by two "balancers." The *Tipula*, or Daddy-long-legs, is a very characteristic species, the larva of this in wet seasons does enormous damage, eating the roots of the crops in its burrowings under ground. The Mosquito and common Housefly also belong to this Order.

The next Sub-class, the HEMIMETABOLA, is divided into three Orders. (1) NEUROPTERA, embracing a great variety of insects, so different that they have at times been classed in different Orders. The most interesting of the few species exhibited are the Ant-lions, the Dragon-flies, and the White-Ants. The Ant-lions, in the larval state, dig holes in the sand, concealing themselves at the bottom, and merely leaving their heads above the sand; when an insect comes to the hole and looks over, the Ant-lion, throws up a shower of sand with its head till the animal falls down to the bottom into the jaws of its foe and is very soon sucked dry, and the skin then thrown out of the hole by a jerk of the Ant-lion's head. The Dragon-flies are extremely voracious and devour large quantities of insects; in the larval state, which is spent in the water, the insect has its lower lip developed into a curious kind of mask at the end of a jointed arm, which fits over the face and is furnished with a pair of forceps at the tip, by means of which it can catch passing insects. The White-Ants, which must not be confused with the common Ants, build large pyramids of clay, often as high as a man and strong enough to support him when standing on them; the males and females are produced in immense numbers at a certain time of the year, and on emerging from the nest are destroyed in such numbers that it is marvellous how any escape. The female, on reaching the nest, either loses or bites off her wings, and in an incredibly short time her body swells to an enormous size, rendering her quite unable to move, and her whole duty is then to lay eggs, of which it has been asserted that she lays 80,000 a day. A specimen, in spirits, of a Queen Termite is exhibited.

(2) The ORTHOPTERA have the upper wings smaller than the lower and of a different texture; the lower wings are folded up like a fan, and the mouth is furnished with biting jaws. The Sub-order, *Saltatoria*, comprises the Locusts, Grasshoppers and Mole-cricketts; these last have the fore legs enormously developed, as in the Mole, and can burrow in the ground with

great rapidity; they generally live upon vegetable food, but animal food, even of their relatives, does not come amiss to them. The Sub-order, *Gressoria*, comprises the *Phasmidæ* and *Mantidæ*; the former assume very varied forms, resembling bits of stick or leaves; the Leaf-insect (*Phyllium*) is very curious, and, corresponding to it on the other side of the Stick-insect is another insect exactly like a dead leaf. The *Mantidæ* have the fore legs very long and armed with formidable spikes; when at rest these are folded up as if the animal were praying, but the limbs are only held in this position to be in readiness to seize any passing insect and hold it so as to be easily devoured. The next Sub-order, *Cursoria*, includes the Cockroaches, of which the females often want the lower wings.

(3) The HEMIPTERA are divided into two Sub-orders, the *Homoptera*, with the upper wings membranous throughout, and the *Heteroptera*, having the part of the upper wing next the body "chitinous" like the upper wings of beetles. The Mandibles and Maxillæ are converted into lancet-shaped organs, and these are protected by the elongated lower lip and its two palpi, which form a tube in which they lie and can be protruded by muscles at their base. Of the *Heteroptera* the Field-bugs, with their flat triangular bodies, form an important section, as well as the Water-scorpions and Boat-flies; the former have their fore-legs something like those of the Mantis, and the other four slender and often very long; the Boat-flies (*Notonecta*) swim about on their backs and have the hind pair of legs much elongated and formed like a pair of oars. Of the *Homoptera* may be mentioned the *Coccidæ* or Scale-insects, of which the females are wingless and often very deformed; the specimens exhibited are those of the Cochineal insect (*Coccus Cacti*) from Mexico, and the produce of the Lac insect (*Coccus lacca*) from the East Indies; in the former case the insect itself is used for the well-known red dye, and in the latter, the exudation from the body of the insect, which is known by the name of Lac. Seed-lac is procured by pounding the animals, and then extracting the colouring matter by water. When this extract is strained and allowed to harden in the form of thin flakes it is called Shell-lac. "The female deposits her eggs between the lower surface of her body and the surface on which she rests; as the eggs are extruded the body of the mother shrinks, until her dried integuments serve as a protective covering to the mass of eggs." The *Cicadas* are of considerable size in tropical countries, and the males have the power of producing an astonishingly loud sound. The *Fulgora*, or Lantern-fly, a native of Brazil, is remarkable for the large expansion at the top of its head, which was formerly considered to be luminous, but this has now been found not to be the case.

The third Sub-class, the AMETABOLA, consists of very small animals, figures of a few of which are exhibited.

MYRIAPODA.

This is a very small Class, the animals composing it being known by having a distinct head, and a pair of legs on each division of the body; in one order there appear to be two pairs of legs to each division, but this is caused by the union of two divisions, as may be known by the spiracles, which in these insects are found on each segment, whereas they strictly occur only on every alternate one. In some cases the young, on escaping from the egg, possess all the characters of the parents except that the number of divisions, and consequently of limbs, is always less. In these cases the number of limbs proper to the adult is not obtained till after several moults, the entire process being stated to occupy as much as two years in some species. The specimens exhibited, which come from Brazil and the West Indies, had been preserved in spirit, and when dried shrank to their present proportions; one at least was nearly two inches longer than it is now. It is a poisonous species.

ARACHNIDA.

The majority of the Insects composing this Class are very small; the only families which will be noticed are the Spiders and Scorpions. In the structure of the body they approach very closely to the Crabs, but they breathe by means of tracheæ and in other points approach Insects. The structure of the mouth is very curious and its modifications from the typical mouth are interesting, though unfortunately the names given to each part are very misleading. There are no apparent antennæ, but they are modified into a pair of mandibles, with strong hooks at the end, by which they can poison their prey in the same manner as the Viper; the true mandibles are wanting, whilst the palpi of the lower lip are converted into the first pair of legs. However, the ordinary names given to the parts are, beginning from the front backwards, a pair of mandibles with their poison-bearing hooks, a pair of maxillæ, a pair of well-developed palpi with their extremities swollen into a club in the males but furnished with pointed claws in the females, and a lower lip. In Scorpions, there is also an upper lip and the Palpi are converted into strong nipping claws. Of the Spiders, the Bird-killing Spider (*Mygale aviculare*) from Brazil, is the largest species known, and is now believed to be able to kill small birds. The Trap-door Spider (*Cteniza fodiens*) from the South of Europe is also worth notice; some of its nests are exhibited, the trap-doors easily escaping notice from the similarity of their outer surface to that of the surrounding ground. The spinneret of the

Spider, unlike that of a Caterpillar, is situated at the tail, and consists of four or six "spinnerets," each of which is pierced with numerous minute tubes through which the silk in a fluid state flows and rapidly hardens on exposure to the air. Scorpions are singularly flat, so as to be able to creep under stones; the last six segments of the body are much smaller than the others and form a sort of tail, the last joint being modified into a hooked claw with a poison gland by means of which the animals kill the insects on which they feed. They abound in hot countries, and are common on the Steppes of the Caucasus, where the sheep are very fond of them, and those who have to sleep on the plains usually take some sheep with them to devour the Scorpions before settling down for the night.

CRUSTACEA.

It will be as well to describe rather fully the structure of a typical Crustacean, as a Lobster. The body is divided into two very distinct parts, commonly called the head and the tail; the former consists not only of the head but also of the "thorax," the two united together and covered by a large plate, called the "carapace." The "tail" is really the abdomen, and consists of six or seven rings joined together by membrane so as to make it very flexible; the last joint has no appendages and is called the "telson;" next to this telson come six rings with pairs of appendages on the under surface; each of these appendages is called a "swimmeret," and consists of a stalk with a pair of branches. These branches are very large in the ring next the telson, and form very powerful paddles, but in the next five segments, they are much smaller. As we proceed towards the head, the swimmerets will be seen to become gradually converted into legs without nipping claws, then into legs with them, till we come to the great claws; after this the swimmerets are converted into "foot-jaws," serving the purposes of mastication; then maxillæ, then mandibles, then the large antennæ, next the small antennæ with their two branches, and finally the stalks, at the extremities of which are situated the eyes. The whole series forms a beautiful instance of the variety of adaptation of the same structure.

The Crabs have a structure essentially like that of the Lobster, but the abdomen is very slightly developed and is folded under the carapace; notwithstanding this, the internal structure shows that Crabs are higher than Lobsters. From their short "tails" they are called *Brachyura*. There are three main forms of *Brachyura*, (1) those which have very pointed "snouts," the carapace being considerably contracted in front, (2) the Swimming Crabs, known at once by the hind pair of feet being expanded so as to form paddles; and (3) the Land Crabs; the most interesting of these are the "Caller Crabs," which have

one claw much larger than the other, and when pursued lift this large claw up and down as if challenging the pursuer. Between the Crabs and Lobsters come the *Anomoura*, or Hermit-Crabs, known by having the abdomen quite soft, merely enclosed in a membrane, and the animal has therefore to seek the protection of any empty shell large enough for it. There is a sucker at the end of its tail, and it has also two or three pairs of rudimentary feet to enable it to keep in its borrowed shell and one claw much larger than the other, serving as a door to the entrance of the shell. Closely allied to the Hermit Crab is the Robber Crab, which does not require the protection of another shell. This animal feeds on Cocoa Nuts; it first pulls off some of the fibrous covering from one end so as to expose the holes through which the young root is destined to push its way, and then breaks through one of them with its large claws; when this is done it gets out the soft part inside by means of the small pincers at the extremities of its hinder feet. The Lobsters from having a long "tail" are called *Macroura*.

Crabs and Lobsters form the Order DECAPODA, from having ten feet; the next Order, the STOMAPODA, or mouth-footed, are much less highly organised; the carapace does not cover so much of the thorax, the gills, instead of being in a gill chamber in the thorax, are transferred to the swimming-feet, and the first pair of legs is furnished with a formidable row of teeth and bend up so that the terminal joint fits into a groove in the second like a pocket comb. These animals, of which the Locust Shrimp (*Squilla Mantis*) is an example, live more in the open ocean, and with their powerful tail are able to go through the water at great speed.

The MEROSTOMATA, or Thigh-mouthed Crustacea, are represented by only one Genus, *Limulus*, or King-Crab. The soft parts are encased within a double shield-shaped shell with a long spine called a Telson; the front part of this shell represents the head and the hinder part the thorax and abdomen, but this latter is quite rudimentary. The limbs are all attached to the head, and correspond to the antennæ and jaw-feet of the Crab and Lobster, though some Naturalists consider that the antennæ are not developed. The bases of the limbs are spinous and act as jaws, whilst their terminations are converted into nipping-claws. The gills are placed under the hinder shield and are broad and leaf-like. The development of the *Limulus* is very similar to that of the Scorpion, and perhaps it ought to be classed with it. A pair of large compound eyes is placed on the upper surface of the Shield or Carapace. The King-Crabs are found in the Indian and Japanese Seas.

All the remaining families of Crustacea are very small, except the CIRRIPIEDIA, so called from the limbs being converted into "Cirri," the two branches of each limb being fringed with bristles. The young animal is very different in appearance from the adult and can swim freely about in the

water ; after undergoing a change, corresponding to the pupa state and being ready to turn into its final stage, it selects a suitable place to which it becomes firmly adhered by a glutinous gum, which exudes from the antennæ, so that the animal is fastened by its head to the object selected. Another change takes place, and the animal appears either as a Barnacle (*Lepas*) or an Acorn-shell (*Balanus*) ; in the former case the head is greatly lengthened forming a kind of stalk, and the body is enclosed in a set of shells united together by membrane and capable of being moved upon one another ; in the latter it is surrounded by a series of shells united into a kind of pyramid, open at the top and the aperture closed by a second series of shells. The limbs, which at first worked in the direction of the head, now work in the opposite direction, and are constantly moving so as to produce a current of water to the animal inside the shell.

The second Division of Annulosa, the ANARTHROPODA, consists of animals with an elongated worm-like body, composed of similar or nearly similar segments. The nervous system consists of a pair of ganglia in each segment, connected together into a chain by a double row of nerve-cords. The Anarthropoda are divided into three classes, (1) the CHÆTOGNATHA, or Arrow-worms, a very small class, not represented in the collection ; (2) the ANNELIDA, or Ringed-worms, with the body distinctly divided into segments ; in these animals the gullet, stomach and intestine lie in a body cavity, which is divided more or less into separate divisions, and though there is no true heart, yet there is a contractile vessel with red or green blood ; and (3) the GEPHYREA, or Spoon-worms, with the body never divided into distinct segments ; in these animals the nervous system consists of a single cord without any ganglia ; no locomotive organs, except occasionally a few bristles or spines ; and the outer skin leathery or horny. The *Bonellia*, of which a model is exhibited, has a long branched proboscis, supposed at one time to be a tail.

The ANNELIDA are divided into four Orders :—

(1) *Errantia* ; these have no shell, but move about by means of hair-like "foot-tubercles," and breathe by means of gills, in the form of tufts along each side of the body. The head is provided with eyes, and two or more feelers, (not jointed, and therefore not to be compared with those of Crabs or Insects). The *Aphrodite* or the Sea-mouse, with its double row of membranous plates giving a beautiful iridescence, and a Model of the *Nereis*, or Sea Centipede, are represented.

(2) *Tubicola* ; these live in tubes either of Carbonate of Lime, sand, or sand and pieces of shell, or are membranous or leathery ; in the first case the tube presents some resemblance to the shell of the *Vermetus* among the Mollusca, but the animal is entirely free from the shell, and can draw itself in and out of the tube by little bundles of bristles on its body rings. The animal

has beautiful feathery gills, and one of the cirri is much developed and carries at its extremity a conical plug whereby the mouth of the tube is closed when the animal is retracted within it. Models of the *Serpula* and of the *Spirorbis*, with its shelly tube coiled into a flat spiral are exhibited; the latter is an extremely small animal; a model of the shell of the exact size is given.

(3) *Oligochaeta*; these have small, stiff bristles on their sides and ventral surfaces, and no gills; the common Earth-worm is a familiar example.

(4) *Hirudinea*, or Leeches. The stomach of these animals is unusually large, and the space between it and the outer skin is filled with a spongy tissue, more or less completely obliterating the body cavity. There is generally a sucker at each end, but in the *Clepsine*, of which a model is exhibited, there is only one on the head.

The SCOLERCIDA include the Flat-worms, the Round-worms, and the Rotifers. The two former are parasitic, and the latter, though not unlike the Infusoria, have a much more highly organised structure.

ECHINODERMATA.

It will be advisable to describe roughly the structure of a Sea-Urchin, or *Echinus*, and then to point out the variations from this structure in the different orders. A typical *Echinus* consists of a nearly spherical box, or "test," of Carbonate of lime, containing the viscera, and furnished on the outside with numerous spines as well as a number of "tube-feet." The test is made up of numerous pieces, arranged in 20 rows running from top to bottom like the meridians on a globe, leaving a hole at each pole; these rows go in pairs, one pair having a number of small holes in it, and the next pair having none, so that there appear on the test five spaces with double rows of holes (called ambulacral areas) separated by five spaces without holes (called interambulacral areas); through these holes proceed the "tube feet," which are longer than the spines, however long these latter may be. The "tube-feet" consists of tubes with a sucker at their outer extremity and connected with the water vascular system inside. From the water system proceed delicate tubes, and these tubes, after passing through the holes, are united in pairs, each pair forming a tube-foot. The spines are fastened by means of muscles to small prominences scattered regularly over the surface of the test, and, as the base of each spine is hollowed out so as to fit the prominence, they have free movement in all directions. Around the upper orifice are five larger plates, each with a hole for the passage of the eggs, and one of them has a spongy surface acting as a sort of sieve, allowing the water to enter the Water-system and yet preventing sand or other impurities from entering it. This is called the "Madreporiform Tubercle." The mouth of the lower orifice is

surrounded with a membranous border, and the centre of the aperture is occupied with a curious arrangement of five teeth, surrounding the gullet and called the Lantern of Aristotle. The structure of this Lantern is too intricate to describe without a diagram, though a specimen is exhibited.

The development of the Echinus is most extraordinary. The young animal is totally unlike the adult, and before it was known to be what it really is, it was called a "Pluteus;" and the curious thing about it is that the perfect animal appears to be merely an outgrowth of the Pluteus, and only takes a small portion of it. It is first formed as a mass of cellular "protoplasm" at one side of the stomach; this increases and envelopes the stomach, which it ultimately takes for itself, and discards the rest of the Pluteus. Another equally remarkable method of increase has been noticed by Sir Wyville Thomson among the Echinoderms of the cold northern and southern seas. "In these cases the eggs are hatched and the young are brought up within or upon the body of the parent; there is no sort of organic connection between the young and the parent, but the young are often brought up in a special receptacle upon the exterior of the mother, to which the appropriate name of *Marsupium* has been given."

There are several forms of Echinus; in some both apertures are on the under surface, sometimes the test is very flat, and then the five "ambulacral areas," as the plates with holes are called, appear as a five-rayed star on the upper surface; sometimes the test is more or less cut into between these areas, and it is not very difficult to imagine a series of forms, leading to the Star-fish, in which the test consists of a soft skin with numerous hard plates, tubercles, or spines imbedded in it; the five rays are essentially parts of the body, as the stomach has projections into each of the arms, and the under surface is hollowed out for the water-tubes or "ambulacral feet;" we thus get a typical example of the *Asteroidea*. The next step is where these arms are distinct from the body and are merely appendages, as in the *Ophiuridea*. These arms may have jointed branches, or may be themselves divided into branches, and then we get a *Comatula*. The *Comatula*, when young, is attached to the rock by a stem, and is only a free-swimming animal in its older state; if we imagine this "larval" or stalked state to be permanent, we get the *Pentacrinus*; the whole of these modifications can be well seen in the specimens exhibited.

The ECHINODERMATA are divided into seven Orders, of which the two first are fossil and have no living representatives. The third Order, *Crinoidea*, or Sea-lilies, has very few living species, the commonest being the *Comatula*, alluded to above.

The *Holothuroidea*, or Sea-cucumbers, are very different in appearance. The body is covered with a soft skin with sometimes a few scattered grains

or spines of calcareous matter; this skin is endowed with wonderful contractility by means of powerful longitudinal muscles, and in consequence of this they can in many cases eject all or almost all their internal organs, and can sometimes divide their bodies into several parts when injured or alarmed. There is always a mouth at one end of the body, surrounded by a circlet of feathery tentacles, which are believed to be modified tube-feet. True tube feet are sometimes wanting. The Holothuroidea are the most highly organised of the Echinoidea.

(5) *Ophiuroidea*, or Brittle-stars, have their arms like the tails of snakes (whence the name), which are quite distinct from the body, being only appendages for the purposes of locomotion; the tube feet have no suckers at the end, but are very sensitive and probably serve for the purposes of respiration; they have the singular power of breaking their arms into fragments, which are often flung away to some little distance from the disc, new ones growing out from it again after a longer or shorter interval; in fact this readiness to throw off the arms makes it very difficult to procure specimens in a perfect state.

The *Asteroidea*, or Star-fishes, have been sufficiently described as regards their internal structure; they have the power of renewing a lost limb, or even, when torn into five pieces, to grow into five separate animals, and hence when they were torn in half on being caught in oyster beds, the keepers only increased the number of their enemies. They are very voracious animals, feeding indifferently on Shell-fish, Crabs, Anemones, Worms, and all kinds of carrion. Oysters have but little chance against them. "The Star-fish enfolds the shell with its arms, and protrudes the lower portion of its stomach through its mouth, until it can seize upon the body of its unfortunate occupant. Little by little the great stomach is pushed farther and farther out of its own body and over that of its prey, until at last, if the oyster be a large one, the pouches are withdrawn from the rays and the Star-fish is substantially turned inside out." Having digested the Oyster, it put its stomach back again into its own body.

They differ much in the shape of the body. An ordinary Star-fish has five rays, the *Solaster* has a large disc with from 12 to 15 rays, shorter than the diameter of the disc; the *Goniaster*, or Cushion star, has a five sided disc flattened on both sides, the rays being only marked by the "ambulacral grooves" on the lower surface.

Lastly, the *Echinoidea*, or Sea-Urchins, are protected by a Test composed of numerous plates, which though fitting closely together, are yet increased in size as the animal grows by depositions of Carbonate of Lime on their edges, the flesh of the animal passing between the plates and in fact covering the whole of the outside, spines and all. The two apertures are sometimes

both placed on the lower surface, and consequently a corresponding alteration takes place in the internal arrangements. The variation in the length of the spines is considerable, those on the surface of the Cake-Urchins being almost invisible to the naked eye, whilst some of those on the *Acrocladia* are quite six inches long.

CŒLEENTERATA.

These animals have been described as having a body cavity with the parts radially symmetrical. The sub-kingdom is divided into two Classes, (1) where the body cavity and digestive cavity are one and the same, called *Hydrozoa*; and (2) where the stomach consists of a tube hanging down from the mouth but is open below into the body cavity, and is not thus properly partitioned off from it, called *Actinozoa*. Simple as the animals appear to be as regards their structure, it is difficult to understand the full details, and it will be best, therefore, merely to describe only those species of which specimens or models are exhibited.

But it will be as well to give a few general remarks before entering into particulars. The simplest animal in this Sub-Kingdom is called a *Polype*, which consists of a bag capable of being fastened to an object by a sucker at one end, whilst the other open end is surrounded with a series of tentacles. So simple is the structure that the animal is capable of digesting its food inside out, so that either the inner or outer skin can assimilate the food. It has also the power of increasing not only by means of eggs but also by means of "buds," sending out a bud from the outside, which develops tentacles and body cavity, and when full-grown separates from the parent and becomes a distinct individual; sometimes the bud sends out secondary buds, before it is detached, and the secondary buds may send out other buds, and so on, the whole forming a kind of tree of living polypes.

Many species have what are called "urticating" or stinging organs, consisting of a bag, in which a thread is coiled up, and at the slightest touch the thread is liberated and uncoils, being often many times as long as the bag; in very few species can the human skin feel these stinging threads, but they certainly have an effect on the animals caught as prey. Sometimes, the polype has the power of protecting itself by a tube of horny or calcareous matter, and when the buds are given off, they too are covered with a branch of this tube (and so never separate from the parent), and the original animal may develop into a branching tree, only in this case all the separate polypes are united together inside the branching tube and form one compound animal.

The *ACTINOZOA* are divided into four Orders.

(1) *Ctenophora*. The animals of this order are very different from those of the other three, and consist of free-swimming animals, with apparently very little structure, but though they have the stomach and body cavity freely communicating, there are several canals which make the inside much more complicated than would appear at first sight. The animals appear as if made of jelly, the most curious being the Venus' girdle (*Cestum Veneris*), the alimentary canal of which is about two or three inches in length, but the animal is greatly elongated on each side till a ribbon-shaped body is produced, four or five feet long; it is not uncommon in the Mediterranean and has the power of phosphorescence, appearing at night as a moving and twisting band of flame; its powers of locomotion are obtained by a fringe of hairs, or cilia round the edge of the body. The *Berœ* is a Melon-shaped body with an enormous mouth, stretching right across the oral extremity of the body; the cilia are arranged in eight bands (or *ctenophores*) proceeding from near the mouth to near the opposite pole of the body. The *Pleurobrachia* is not unlike the *Berœ* in external appearance, but it has two very long flexible tentacles, fringed on one side by smaller processes, and arising from two sacs into which they can be instantaneously and completely retracted at the will of the animal; there are besides some very important internal differences.

To understand the remaining orders, it will be necessary to describe the structure of a Sea-Anemone. The body ordinarily consists of a short cylinder, called the "column," and is of a soft leathery consistence; the two ends of the column are termed respectively the "base" and the "disc," the former constituting a kind of sucker, by means of which the animal can attach itself at will, whilst the mouth is placed in the centre of the latter. The mouth is surrounded by a flat space destitute of appendages, and the circumference of the disc has a number of tentacles, the interiors of which communicate with the body cavity; the mouth leads directly into the stomach, which is a wide membranous tube, opening by a wide aperture into the body cavity below, and extending about half-way between the mouth and the base; the space between the stomach and body-wall is divided into a number of compartments by vertical plates, so that a cross section presents very much the appearance of that of an orange, only the partitions are not so numerous and do not all reach the stomach-wall; these partitions are called "mesenteries," to the faces of which the eggs are attached; there are besides a number of white threads, filled with thread-cells, which can be emitted through the mouth or through small holes in the walls of the column. Some animals have the power of secreting a calcareous frame-work between the two walls of the column and also inside the mesenteries, the stomach lying in a cup-shaped receptacle, and consequently when the animal dies and the soft parts decay, there remains a calcareous structure very similar to that of the

living animal in shape, only with the mesenteric partitions visible; this is called a *Sclerodermic coral*, as it is formed inside the living animal. Another set of animals consists of a number of polypes connected together by a kind of flesh called the *cœnosarc* and this *cœnosarc* secretes a horny or calcareous framework on which the various polypes live, of course connected together organically by the *cœnosarc*; the "corallum" thus formed being quite distinct from and outside the polypes, is called a *Sclerobasic coral*.

Omitting the Order *Rugosa*, which consists almost entirely of fossil species, we come to the

Alcyonaria, of which four families are represented; they are all known by having fringed tentacles, and these as well as the mesenteries are always in multiples of four, and (with one or two doubtful exceptions), the polypes are all united by a common *cœnosarc*, and remain fixed to the same spot throughout life. Of the *Gorgonidæ* the best known is the Red coral (*Corallium rubrum*) of Commerce. In this species the sclerobasis is of a bright red colour and finely grooved; the *cœnosarc*, or bark, is also red, but lighter in colour, and is studded with apertures through which the white polypes can be protruded at will; the entire *cœnosarc* is excavated into a number of canals communicating with the polypes, the whole system being filled with nutritive fluid known as the milk.

The *Pennatulidæ* are free, that is, they are not permanently fixed to any object, though some live partially buried in mud; the corallum is like a rod and is sclerobasic; in some species spicules, pointed needle-shaped bodies, are also developed. Two species are represented, the *Pennatula* and *Virgularia*. The former consists of a rod of *cœnosarc* with the upper end fringed on both sides with feather-like branches, which bear the polypes; the other end is smooth and fleshy, and is probably sunk in the mud of the sea-bottom; this latter portion is strengthened by a long slender rod. *Pennatula phosphorea* phosphoresces brilliantly when irritated. *Virgularia* is much longer and more slender, and the polype-bearing fringes are much shorter; the polypes have eight tentacles; the sclerobasis is a long rod, like a knitting needle, and part of it is usually naked.

The *Tubiporidæ* are represented by the *Tubipora musica*, or Organ-pipe coral. The corallum is sclerodermic and is composed of a number of bright red cylindrical tubes united together externally by horizontal floors, which appear to be extensions from the mouths of the tubes, formed at definite times; the polypes are bright green, and have eight tentacles each.

The *Alcyonidæ* consist of a fixed *cœnosarc*, the corallum being represented by calcareous spicules. The *Alcyonium digitatum*, or "Dead-men's Fingers," forms an orange, spongy-looking mass with star-shaped apertures, through which the polypes can be protruded at will.

The last Order of the Actinozoa is the *Zoantharia*, of which the soft parts are in *fives*, or more generally in *sizes*, and the tentacles simple, i.e., unbranched. There are three Sub-Orders, distinguished mainly by there being either no corallum, or a sclerobasic corallum, or a sclerodermic corallum. The first of these, called *Zoantharia Malacodermata*, represented by the Sea Anemones, has been already described; they have a certain power of locomotion, though the family *Ilyanthidæ* has a rounded base and lives buried up to the disc in the sand, and the *Zoanthidæ* have no power of locomotion, the Polypes being united by a branching cœnosarc, as in *Zoanthus Couchii*, a model of which is exhibited. Though there is no true corallum, spicules not uncommonly occur in the tissues of some species.

The next Sub-Order, the *Zoantharia sclerobasica*, has a horny base, and always occurs in colonies. The corallum is much branched, and bears some resemblance to that of the *Gorgoniæ*, but if the animal can be seen they can be distinguished at once, as these have *six* tentacles and the *Gorgoniæ* *eight*; if the animal is wanting they can be distinguished by the surface of the corallum, which in *Zoantharia* is either quite smooth or covered with minute spines, whilst in *Gorgonia* it is grooved. The *Zoantharia Sclerodermata* have the corallum entirely within the polype, and, as has been observed, is deposited from the walls of the stem and the mesenteries; these latter are called "septa," and the septa are frequently, more or less, joined together by rods, or by horizontal partitions, which latter sometimes extend completely across the corallum and divide it into storeys, the only living portion of the animal being above the last formed floor. It is mainly by animals of this Sub-Order that the coral reefs are formed, and very few solitary individuals occur in it. The methods by which the compound coralla are formed are mainly four.

(1). By simple budding, the original polype throwing out a bud from its side, and when that has become perfect, it sends out a bud, and so on. This is the commonest mode of growth, and gives rise chiefly to the tree-like corals.

(2). The original polype gives forth from its base a rudimentary cœnosarc, from which new buds are thrown up; the result is a massive corallum, with the youngest corallites on the outside.

(3). The original polype sends out buds from the edge of its disc, which in their turn send up others, so that the parents in time get destroyed and the resulting corallum assumes the form of an inverted pyramid. This form of budding is rare at the present day, but was very common among fossil species.

(4). A partition is formed across the mouth of the original polype and a new stomach and new tentacles formed for the part so cut off; in this manner a flat corallum would be formed. But there is a tendency for this

to become massive, and, consequently, instead of keeping flat, the corallum is twisted and folded on itself, till the well-known appearance of the *Meandrina*, or Brain Coral, is produced.

The other Class of the Cœlenterata is the HYDROZOA, of which three Sub-Classes are represented, the *Lucernarida*, the *Siphonophora*, and the *Hydroida*. They are all modifications of the common Hydra, the simplest form of Polype, in which, as has been mentioned, the stomach and body cavity are the same. The first is divided into three Orders (1), the *Lucernariadæ*, represented by the *Lucernaria auricula*, consisting of a cup-shaped body, called the "umbrella," around the margin of which are tufts of short tentacles, whilst at the other end is a sucker, by which the animal is able to attach itself to objects and free itself at will; at the bottom of the umbrella is the "polypite," as it is called, with a quadrangular four-lobed mouth. (2) The *Pelagidæ* are animals rather like a jelly-fish, having an umbrella with marginal tentacles, and a single polypite in the centre, and (3) the *Rhizostomidæ*, with an umbrella without tentacles, and several polypites in the centre. The *Pelagidæ* increase either by eggs developed in the umbrella, or by a very peculiar process, to be described presently, whilst the *Rhizostomidæ* only increase by this process, now to be described. The "egg," or more properly the embryo animal, called a "planula," is at first an oval body, which becomes pear-shaped; it then attaches itself by its narrow end to an object, and shortly assumes the appearance of a common polype with its tentacles and body cavity; the body then elongates and becomes split up into flat narrow segments, so that the animal looks like a pile of saucers; the original tentacles now disappear and a fresh set is produced below the "saucers" a little above the fixed extremity; the "saucers" then gradually fall off, each becoming a "Medusa," and in these Medusæ the "eggs" are produced, which when developed become the fixed hydras. The Medusæ are extremely voracious and increase rapidly in size, "the umbrella of *Cyanea arctica* has been found in one specimen to be seven feet in diameter, with tentacles more than fifty feet in length, the fixed Lucernaroid from which it was produced not being more than half an inch in height." A model of the *Chrysaora*, one of the *Pelagidæ*, is exhibited, the four long lobed processes in the centre being the lips of the polypite, "the folds of which serve as temporary receptacles for the ova in the earlier stages of their development."

The SIPHONOPHORA are represented by the *Physalia*, the *Verella* and the *Rhizophysa*. The *Physalia*, or "Portuguese Man-of-War" is composed of a large spindle-shaped float, upon the under side of which are arranged a number of polypites together with highly contractile tentacles of great length. They are of common occurrence in tropical seas.

The *Velella* consists of a widely expanded float carrying on its upper surface a vertical crest, and in the centre of the under side is a single large polypite and numerous small bodies resembling polypites; the tentacles are attached quite independently of the polypites in a single series along the line where the crest and disc unite. In *Rhisophysa* the polypites are attached to a long thread of "coenosarc" with bell-shaped bodies at intervals by the contraction of which the animal is able to progress through the water.

The Sub-class HYDROIDA are represented at present only by some models illustrating the leading types of the Order *Corynida*. *Eudendrium* may be taken as a good example of the "composite" division of the Order, where the animals live in colonies attached to one another. It consists of numerous polypites united by a coenosarc which is more or less branched and is defended by a horny tube; the polypites are situated at the extremities of the branches but cannot be retracted within the tubes; there are about twenty tentacles arranged in a single row round the mouth. *Tubularia* is similar to *Eudendrium*, but the tubes are not at all or only very slightly branched; a model of a polypite magnified is given, from which may be seen the generative buds, hanging down like bunches of currants, the bud at the extremity shewing a fully-developed polypite. *Coryomorpha nutans* is an example of a "solitary" polypite without any protective covering. There are two rows of tentacles round the mouth, between which is a row of bell-shaped "gonophores," which ultimately become detached as free-swimming medusoids; a model of one of these medusoids is exhibited.

PROTOZOA.

With the exception of the Sponges, these animals are all microscopic, but it will be as well to say a few words about the different Chasses. The *Rhisopoda* are animals composed of a mass of "sarcode," somewhat resembling white of egg, in which is generally a "nucleus" and some hollow contractile spaces; this sarcode has the power of sending out projections from any part of its body by means of which it can move about, these projections are called "Pseudopodia," hence the name of the class to which the animals belong. Some of the *Rhisopoda* secrete inside themselves a shell or "test" of Carbonate of lime and the pseudopodia are very long and join together outside the test so as to form a kind of network; many species have minute holes in their tests called foramina, through which the pseudopodia pass, and this Order is consequently called *Foraminifera*. Chalk is made up almost entirely of the tests of these animals. A third set make their tests of flint or secrete inside them spicules of flint, and these tests are of most beautiful and diverse forms; these belong to the Order *Radiolaria*. The next Order, *Infusoria*, generally have a mouth and rudimentary stomach; they do not possess the power of emit-

ting pseudopodia, but have minute hairs (cilia), by the vibrations of which the animals are enabled to create a current in the water whereby food is brought to their mouths. Some, instead of cilia, have one or two long, lash-like filaments, called "flagella," but sometimes cilia are present as well. Lastly the *Porifera* or *Spongida* are apparently made up of Rhizopoda and Flagellate Infusoria. The Sponge-flesh consists of an outer layer of structureless "sarcode" but beneath this are what are called "sponge-particles" or "sarcoids," some of which have a flagellum, as in Infusoria, whilst others are capable of emitting pseudopodia. This sponge-flesh is supported on a framework of a horny nature, as in the sponge of commerce, or of flint or of lime. There are four Orders of Sponges. (1) *Myospongiae*, which have no framework or skeleton whatever, the organism consisting merely of a mass of sarcode, permeated by branched canals. (2) *Ceratosa*, which have a horny skeleton, as in the common sponge. Many species have a number of spicules of flint scattered through the skeleton and sarcode, which serve as a very important means of classification. Among those exhibited is the common Mermaid's Glove (*Halichondria palmata*). (3) *Silicea*, where these spicules form the entire skeleton, and in some cases become fused together, so that the skeleton becomes a continuous one. The *Euplectella*, or "Venus' Flower Basket" is a very good example of this; beautiful as this sponge skeleton is, it is covered during life by a thick covering of brown sarcode, so that its beauty is not seen till it has been properly cleaned, a very common case with many animals, especially among the Mollusca. The *Hyalonema* or "Glass-rope Sponge" is another example; in this the sponge animal forms a horny skeleton, and anchors it in the sand by a rope made of siliceous fibres.

The Pumice-stone Sponge (*Dactylochaliz pumicea*) is an admirable example of the flinty structure developed to the utmost degree. The framework is wholly composed of flinty spicules all fused together and forming a highly porous mass. It is as hard and stiff as if it had been carved from stone, and is very light, seeming to weigh not more than a piece of cork of the same size.

DESIDERATA.

From the very incomplete remarks about the various specimens in the Museum it will be easily understood that the "wants" are very numerous, and a general idea of them may be gathered from the Hand-book, but it may be as well to enumerate some of the more important desiderata.

Bimana.—Skulls of the Typical Races of Mankind, as well as of the extreme forms. Very excellent casts, price 10 shillings each, can be obtained from M. Trammond, of Paris.

Quadrumana.—A skeleton of a Chimpanzee, as well as stuffed specimens of the different sub-orders.

Insectivora.—Hedgehog and Mole, and skeletons of the same; also a Flying Lemur.

Cheiroptera.—Skeleton of Bat.

Rodentia.—Porcupine and Jerboa.

Carnivora.—Skeleton of Badger; Seal and skeleton.

Proboscidea.—Foot of Elephant; skull of Deinotherium (reduced cast) photograph of Mammoth; other fossil species, reduced models or drawings.

Ungulata.—Camel, skull and foot; Giraffe, skull; antelope and Sheep; foot of Hippopotamus, Tapir, Rhinoceros; skull of pig and Tapir.

Cetacea.—Skull of Narwhal; specimen of Baleen.

Monodelphia.—Ant-eater, and Manis; reduced models of Megatherium and Glyptodon.

Marsupialia.—Kangaroo, Wombat, Phalanger, Opossum, and Thylacinus.

BIRDS.—Casts of Ichthyornis and Archaeopteryx; Secretary bird; Apteryx; typical Humming birds; Bower-bird; Bird of Paradise, &c.

REPTILES.—Casts of Iguanodon (reduced); Megalosaurus, Pterodactyle, Plesiosaurus, Ichthyosaurus, &c.; Rattle Snake; Terrapin.

AMPHIBIA.—Newts; Amphiuma; Cecilia.

PISCES.—Mud-fish; Chimæra; Cestracion; Acrodus; Lepidosteus; Lancelet; and almost any kind of British fish.

Mollusca.—Glass Models of typical species, showing the animal; Auxoux's Model of a Garden Snail; Models of Doris, Cymbulia, &c.

Molluscoida.—Almost any specimens will be useful.

Polyzoa.—Ditto.

INSECTA.—Typical sets of Diptera, Neuroptera, Hemiptera are much wanted; also of Trimeræ, Silphidæ, and Dytiscidæ among Coleoptera; of Gall-flies, Ichneumon-flies and Ants among the Hymenoptera; Blattidæ and Forficulidæ among the Orthoptera.

CRUSTACEA and ARACHNIDA are much wanted.

ECHINODERMATA.—Pentacrinus and Comatula.

Corals, Sponges, and Models of Foraminifera are much wanted.

Some of these, especially casts of fossil animals, have been sent on loan by various Tradesmen, in the hope that they may be purchased for the Museum.

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